MARCH 6, 1941

The IRON AGE

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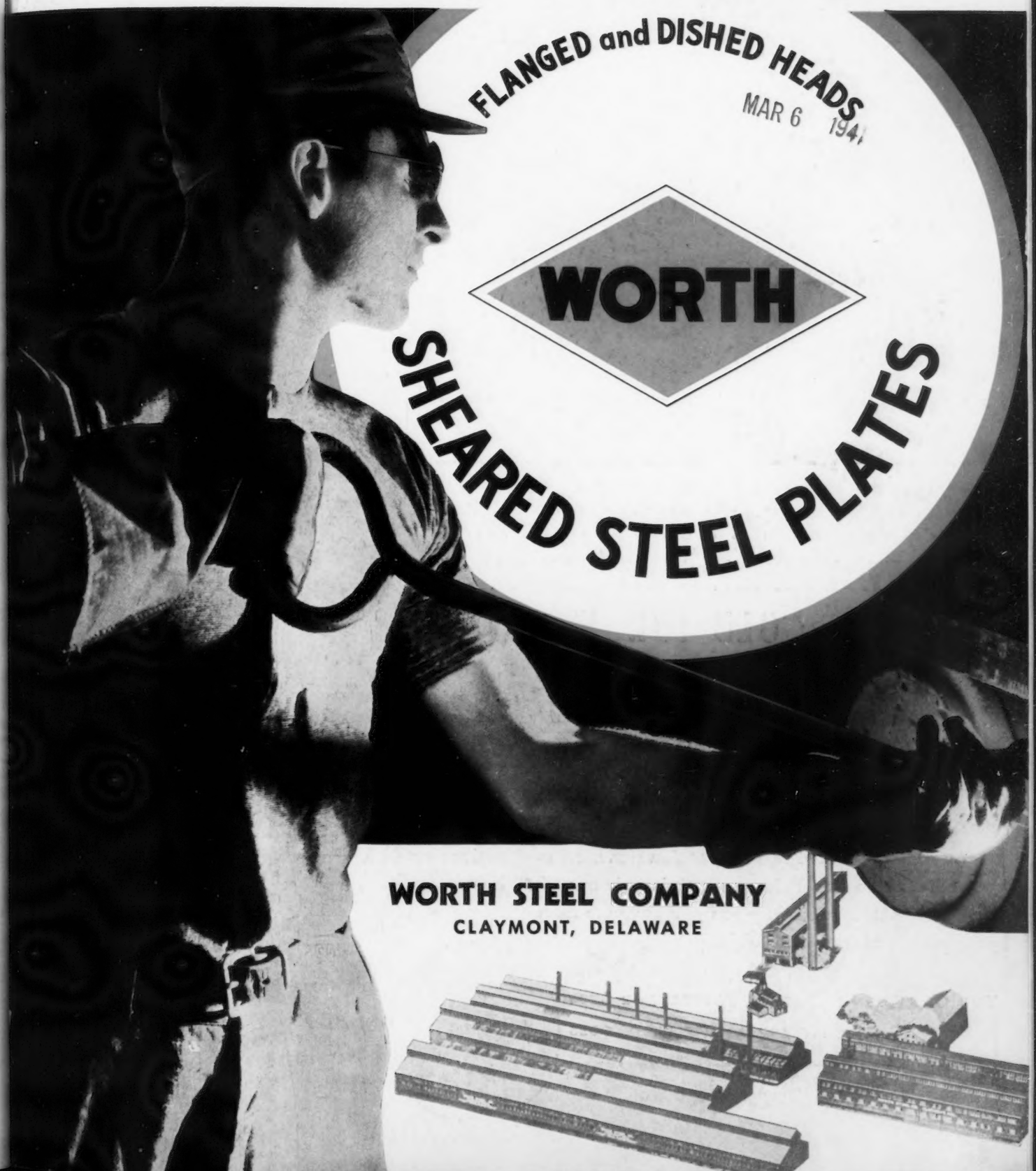
WORTH

SHEARED STEEL PLATES

WORTH STEEL COMPANY
CLAYMONT, DELAWARE



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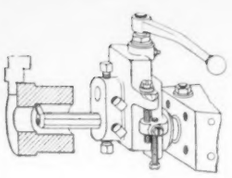
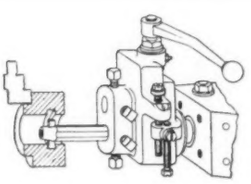
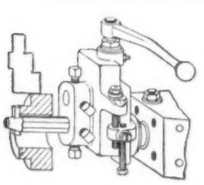


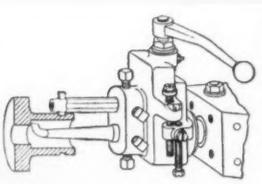
1. Deep Hole Facing. When end of bore is reached, the operating lever moves the Angular Stub Boring Bar, and deep hole face is cut squarely and accurately.



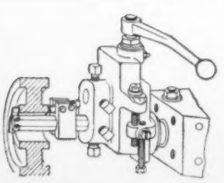
2. Recessing. Here a Straight Cutter Stub Boring Bar recesses an inside groove. The graduated dial stop screw can be set to hold and repeat accurate depths.



3. Back Facing. Here a Straight Cutter Stub Boring Bar back faces the piece.



4. Boring and Outside Grooving. When the boring cutter finishes the inside cut, the slide is lowered and the Straight Stub Boring Bar Cutter forms the outside groove.



5. Straddle Facing. Two Cutters simultaneously face both sides of the piece.

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MARCH 6, 1941

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The Iron Age

MARCH 6, 1941

ESTABLISHED 1855

Public Misinformation

WHEN a man is elevated by his fellow men to a position of power and influence, the public expects him to set an example both for knowledge and probity. Thus, when he makes an important statement to the press or to an audience, he should be sure of his facts and he should present them without twisting or distortion.

Such a man is Philip Murray, president of the CIO and head of the steel workers' union.

Mr. Murray ought to know the steel industry. The public would assume that he does from his recent offer to join the Government and the heads of that industry in the management of its affairs.

In Atlantic City on Feb. 25, Mr. Murray addressed the 12,000 people attending the 71st annual convention of the American Association of School Administrators.

Charging that the Army and Navy had discriminated in placing defense contracts in favor of a few large corporations, Mr. Murray, as widely reported in the press, said that one steel company was producing 70 per cent of the nation's armor plate and building 70 per cent of the nation's merchant marine.

In speaking of armor plate, Mr. Murray was speaking of armor plate for ships. This thick plate is produced by pressing and not by rolling as is the lighter armor plate used for aircraft, tanks and armored cars.

Of the four producers in this country who have the enormous furnaces and presses capable of turning out this thick plate and heat treating it, no one company has a capacity of more than 25 per cent of the total. Thus, if any one of the four had 70 per cent of the armor plate business, the other three would have but 30 per cent of it and would be operating at only 25 per cent of their capacity.

This of course is ridiculous on the face of it. If it were true it would be an indictment of the Navy's intelligence; not being true it reflects on Mr. Murray's knowledge or credibility. Take your choice.

His statement that this same company is also producing 70 per cent of our merchant vessels is equally misleading and untrue. A recent listing of all merchant marine vessels on order or under construction prepared by the authority "Marine Engineering" and published in January shows that the company having the largest merchant ship tonnage on order has but 35 per cent of the total.

Merchant vessels now under construction in this country for the Government as well as for private accounts aggregate 1,952,452 tons. Of this total the largest single backlog is 675,500 tons.

Our Naval authorities and the OPM are playing no favorites. They place orders where there is the ability and the capacity to produce the goods with or without the union label.

Stretching the truth 200 per cent may be permissible when telling a fish story to your friends. It is not excusable when a top flight labor leader addresses the American public.

Inland Watches the "Little Things" That Help Make Quality Steel

An important reason why true value is in each pound of Inland Steel is the close attention to every detail of Inland steelmaking. Proof of watchfulness over "little things" is found throughout the Inland plants, and in all service departments.

Take for example, tests at the Inland open hearth furnaces. Repeated tests are made of the molten bath and slag from each furnace to determine the progress of the refining action of each heat. Analyses are made for carbon, manganese, phosphorus and sulphur in the steel, and ferrous oxide in the slag. Each analysis is accurately determined within 30 minutes from the time a sample is taken. Not a single detail of furnace operation and product control is omitted in refining Inland Quality Steel.

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ARMORED STEEL

o o o

By T. W. LIPPERT
Technical Editor, The Iron Age

o o o

—Today, composite steels have come of age. Thousands of tons are in service and the future is bright indeed. Fabrication is frequently easier, costs are lower, and the possibility of great saving in strategic materials is of particular importance as war creeps ever closer.

'WAY back in the dim reaches of time, some unknown but very skilled Second Dynasty Egyptian metalworker hammered out a ewer. His workmanship was quite meticulous—perhaps he had a lot of time on his hands, what with his wife away all day over at the brewery helping out with a batch of beer. What really puts the ewer in a class by itself, however, is that it is the oldest known example of plated metal. There's a thin smear of silver over the copper body, and evidence points to crude hot hammer forging of the two metals prior to fabrication of the vessel.

Such plating operations became increasingly familiar as the thousands of years passed. Sometimes the plating was decorative in intent; sometimes complete deception was intended—as, for instance, 4000 years later when the Egyptian government used to each year "wow" the natives of Mecca by sending a "Holy Carpet" woven of gold thread. But, the gold thread was plated silver; bars of silver were wrapped round with thin sheets of gold and hot hammered together, then passed through a series of draw plates. Then, the first shift from plated non-ferrous metals to a completely utilitarian plated ferrous metal occurred some hundreds of years later, in the fifteenth century, when Bohemian ironworkers in the Erzgebirge mountains introduced tin plate.

Really great strides in plated materials only got off to a good start within recent years, however. Everyone today is familiar with electroplated metals, used either for decoration or for protection. But, electroplating is both slow and expensive, and it has only been within recent years that some other method of joining ferrous metals progressed much beyond the hot hammering operation of the

Second Dynasty Egyptian metalworker.

Innumerable attempts have been made to get a firm bond between ferrous metals, and all these major efforts have been correlated into a progressive history in the footnote on this page. The newest of such methods, and one about which very little is known, is a facing operation developed by R. K. Hopkins at the plant of the M. W. Kellogg Co., Jersey City. After many test runs at that plant, the Allegheny Ludlum Steel Corp. became interested, and in August, 1939, asked that a machine be designed for them. This was done, and the first heat made on the machine around the end of 1939, was of commercial grade and is today seeing service in many a kitchen utensil throughout the land. The process and product are frequently called Pluramelt, although of late the facing of carbon steel with stainless alloys is referred to as armoring of steel against the ravages of corrosion, heat and wear.

Any new industrial practice, like the three-hooped pot, is bonded into a practical unit by virtue of three equally important components:

(1) Production technique.
(2) Product characteristics.
(3) Product applicability.

Quite naturally the latter is of major laic concern—for, after all, consumer acceptance is the one component which can neither be slurred nor romanticized. None the less, the production technique and characteristics of the product are of more than academic interest, and their examination permits a more sensible evaluation of the entire process.

The spate of Pluramelt publicity a year ago was directed to establishing the premise that the union between stainless facing and carbon steel was like the Hitler-Mussolini *affaire d'amour* — "indissoluble." Other than demonstrating satisfactory performance in every physical test that human ingenuity could devise to prove the permanency of this bond (see THE IRON AGE, Feb. 8, 1940, and page 42 herein), nothing else has been forthcoming from Brackenridge. This has been a conscious and deliberate policy.

Only a few company officials and workmen have been in the locked building housing the Pluramelt equipment. The industry as a

Composite Metal—70 Years of Inventive Persistence:

The only reliable record of the constant attacks on the exasperatingly difficult procedure of facing a ferrous metal with some other ferrous or a non-ferrous metal is bundled up in the dusty files of the U. S. Patent Office. The crackle of old patents could well be the susurrant scratching of inventors' heads—heads harassed with the necessity of securing a perfect union of the two metals.

Literally hundreds of inventors have made a pass at composite metals. There has been much chaff and some kernels of new ideas. The kernels are about as follows:

The union of dissimilar metals by casting or by casting and working (forge welding) is one of the oldest of the present methods and is probably the first to find its way into a U. S. patent. Thus, in 1868, U. S. patent No. 73,375 was issued to J. Park, Jr., for a method for, "combining copper and cast steel, by casting the molten steel on or around the copper, which is previously heated, thus forming an ingot which may be hammered, rolled, or otherwise worked into any desired shape."

In 1869 Absterdam (No. 97,582) set down an idea for the manufacture of a composite steel which was made up of a Bessemer steel base and a cementation steel coating. And, in 1872, Meneely (No. 126,894) described a process somewhat like that of Parks but wherein the iron or steel base metal was preheated and the coating metal, brass, bronze, gun-metal or other copper alloy was poured. The same general method was proposed a little later for the manufacture of armor plate composed of a base of steel of one hardness united to a depth of steel of a different hardness (Nos. 188,458 of 1877 and 239,155 of 1881). From the last date and into the 1900's a considerable number of patents were issued on this same general method of producing composite articles of a wide range of analysis.

Then, C. Davis in 1909 (No. 935,358) disclosed the first radical departure from prior practice. Davis proposed to produce armor plate by fusing a depth of the base plate by means of closely spaced electric arcs and incorporating nickel, chromium, carbon, etc., into the molten metal to produce a depth of metal *integral* with the base but having a different analysis and hardness. It is likely that this patent is what might be termed a "paper patent," as so far as is known the new method was not used successfully to produce any plate.

Berg then presented a further departure from the prior practice (No. 936,514 also issued in 1909). Therein, Mr. Berg contemplated the manufacture of copper or copper alloy clad steel and proposed covering the surface of the steel base metal with a flux to prevent oxidation at high temperature, laying the copper or copper alloy cladding material on the fluxed surface, passing electric current through the adjoining surfaces to generate, by resistance, heat sufficient to commingle the two metals and unite them, then, after the composite has cooled, rolling to desired gage.

Simpson in 1913 (No. 1,064,671) added to the method of Davis (No. 935,358) the idea of carrying the operation out in a vacuum. Here again the patent is likely a "paper patent" as its contribution would seem to render the successful operation of the method even more doubtful.

Next came H. Brown, who in 1915 (No. 1,127,177) disclosed the surfacing of rails with wear resisting manganese steel by means of the electric arc. Brown had several proposals, (1) to place on the rail a strip of manganese steel and fuse it to the rail by means of a carbon arc, (2) to fuse a manganese electrode and the surface metal of the rail to produce a deposit of manganese steel, and (3) to fuse a mixture of manganese oxide, aluminum and iron or steel filings with surface metal of the rail by a carbon arc to produce the manganese alloy in situ. The present author has been unable to find out whether this proposal ever went into use.

Heuser in 1916 (No. 1,196,544) proposed to clad one metal with a layer of another metal by fusing the cladding metal to the base metal by means of the carbon arc.

It was about this time that chromium "stainless" alloys appeared on the industrial scene, and as would logically be expected there immediately appeared attempts to use them as coating material in the cladding of steel. All these efforts can within approximate limits be broken down into the following three categories:

(1) Producing the composite by welding or sweating a plate, or sheet, of alloy to a similar body of base metal by,
  (a) Work, or forge, welding.
  (b) By casting molten base metal against a solid plate, or sheet of the alloy and then hot working the resulting ingot to complete the union of the metals and to obtain the composite in the desired shape and size.

(2) Producing the composite by uniting a sheet or plate of the alloy of the final thickness to a plate or sheet of the base metal, also of the final thickness, by welding one to the other as by arc, gas or spot resistance welding.

(3) Producing the composite by operations in which all of the alloy is deposited in a fused condition on solid base metal. The composite may be worked, but the working is not depended upon to produce the union. This class may be subdivided into,
  (a) When the alloy as such is fused and united, and
  (b) When the alloy is produced in situ during the fusion and welding operation.

Under 1 (a) may be listed the following patents:

Gillespie	1,306,690	(1919)	Gordon	2,133,291	(1938)
Kelley	1,365,499	(1921)	Gordon	2,133,292	(1938)
Johnson	1,886,615	(1932)	Gordon	2,133,293	(1938)
Maskrey	1,896,411	(1933)	Gordon	2,133,294	(1938)
Armstrong	1,997,538	(1935)	Ostendorf	2,199,321	(1940)

whole knows little of the process other than the sketchy details set forth in the various Hopkins patents. And, like all masterpieces of the patent attorney's art, the disclosures therein resemble a British Admiralty communiqué — all exigencies are covered, but no information is given to the enemy.

Production Technique

Now, as regards the production technique; the process is unique, cleverly conceived and expertly worked out. It may well be one of the seminal developments of modern steel technology.

As might be expected, the carbon steel usually comes to the Pluramelt machine in the shape of a slab. However, ingots have been used directly in numerous instances. Slab or ingot, the surface is sometimes sand blasted, although surface preparation is frequently ignored. A frame is fastened around the slab, the assembly is picked up by a crane and lowered into the Pluramelt machine. Therein, dogs are tightened to clamp the assembly into such a position that about a 2-in. space is left between the slab surface and the mold wall of the machine.

Into this 2-in. space is lowered the working head of the Pluramelt machine. This head though simple in design, is actually the physical evidence of many years of inventive effort on the part of Mr. Hopkins and several hundreds of thousands of dollars of Kellogg money. As the saying goes, it is "the works," and being "the works" it is quite understandably a rather closely guarded secret. The working head is carried by a framework which runs vertically on guides in the superstructure of the Pluramelt machine. As large slabs require considerable vertical movement, this superstructure is quite lofty.

Feeding mechanisms for the raw materials are located in various sections of the superstructure—it is here that a unique steel making practice is evidenced, a practice involving *continuous* and *precise* feeding of steel constituents down through the working head. The feeding equipment is made up of a number of metering machines, all controllable from a central operat-

---

Johnson 2,059,584 (1936) Huston 2,225,868 (1940)
Ostendorf 2,064,684 (1936)

It should be of interest to note that even Gillespie, who was the first in this field, considered his contribution to be a new article of manufacture rather than a new method—he discloses no more than the then known methods of producing clad materials. It is obvious from these patents that difficulty was experienced in bonding chromium-containing alloys to carbon steel by the hot working method. Thus, the first Johnson patent is directed to facilitating this bonding by, (1) the removal of air between the metals, (2) the provision of an intermediate sheet of pure iron which will fuse more readily to the alloy and the base than these will to each other. Armstrong follows the lines of Johnson but proposes to thoroughly clean the surfaces to be united and to electroplate on one or both of them a deposit of iron in order to obtain a satisfactory bond. It is to be noted that Armstrong also proposes in addition the electro-deposition of nickel or silver to prevent carbon migration from the steel base to the alloy during the hot working. Gordon in his four patents proposes the use of what may be termed a brazing compound (manganese and mixtures of manganese and one of nickel, cobalt, chromium and iron) between the surfaces to be united to assure their union. Huston proposes a nickel sheet between the alloy and the steel base.

Under 1 (b) may be listed the following patents:

Armstrong	1,757,790	(1930)	Ingersoll	1,983,760	(1934)
Ingersoll	1,868,749	(1932)	Harvard	2,056,673	(1936)
Ingersoll	1,963,745	(1934)	Ingersoll	2,094,538	(1937)
Ingersoll	1,967,754	(1934)	Armstrong	2,074,352	(1937)

The patent to Armstrong discloses the general method and points to the main problems. The main problem, of course, is to secure union between the metals throughout their interface: and, another important problem is to prevent undue fusion of the alloy while assuring fusion between the metals. Ingersoll in his patents proposes various solutions for these problems.

Under (2) may be listed the following patents:

Andrus	1,680,276	(1928)	= electric resistance spot welds alloy to base metal.
Johnson	1,690,684	(1928)	= fusion welds alloy to base metal along continuous lines.
Johnson	1,824,898	(1931)	= plug welds unite alloy to base.
Andrus	1,840,305	(1932)	= like prior Andrus patent but unites with base and alloy in the flat, then rolls to shape.
Swearingen	1,920,534	(1933)	= unites alloy to base by welding in slots in alloy.
Andrus	2,015,173	(1935)	= like prior Andrus patents but lining itself is a composite of alloy and steel base.
Moses	2,164,074	(1939)	= plug welds composite lining to steel base.
Trainer	2,214,002	(1940)	= spot welds alloy to base throughout interface; uses a nickel sheet between alloy and base to prevent carbon migration into alloy.

Under 3 (a) may be listed the following patents:

Landgraf	1,709,729	(1929)	= covers inside or outside, or both of an iron pot with overlapping beads of chromium-iron-nickel alloy.
Fifield	1,864,590	(1932)	= forms coating on steel by flowing stellite thereon.
Duff	1,883,630	(1932)	= "fusion-plates" alloy on face of steel vessel.

Under 3 (b) may be listed the following patents:

Armstrong	1,781,490	(1930)	2,191,472; 2,191,473; 2,191,474;
Case	1,909,252	(1933)	2,191,475; 2,174,175; 2,151,915;
Meier	2,091,871	(1937)	2,191,476; 2,191,477; 2,191,478;
Kinkead	2,175,606	(1939)	2,191,479; 2,191,480; 2,191,481;
Kinkead	2,175,607	(1939)	2,191,482; 2,151,914; 2,107,943.

Hopkins Nos.: (1938-40) 2,107,943; 2,151,914; 2,151,915; 2,174,175; 2,191,469; 2,191,470; 2,191,471; Andrus 2,219,352(1940)

Armstrong forms alloy heads on valve stems by fusing metal of the stem metal of the electrode and added metal together. Case and Meier are along the same lines. The Kinkead patents disclose a method somewhat similar to those of Davis and Simpson although probably superior by reason of the improved apparatus available at the later date. Kinkead preheats the base metal and like Simpson progresses the base under the electrodes whereat the fused base metal intermingles with the alloy constituents to form the desired alloy coating. Andrus discloses a method wherein a preformed liner sheet is placed on the metal base as fused thereto along separated lines or spots by means of the submerged arc and an electrode of sufficient alloy content to compensate for dilution by the base. The welding takes place through the liner.

There are also other patented proposals which have not been classed above. Of these, No. 2,046,638 (1936) discloses the packing of the steel base with ferrochrome and NaCl and heating to 1700-1900 deg. F., whereby chromium is absorbed by the steel base to form a chromium alloy coating on the steel.

Hudson (Nos. 2,128,941–2 and 3) discloses continuous methods for producing a clad strip composed of a steel base with alloy coating on each side. Due to the difficulties experienced in producing steel strip continuously by similar methods the practical value of these disclosures is doubtful.

The Mudge patents (Nos. 2,037,732 and 3) disclose methods for producing nickel-clad steel.

Between 1930 and 1940, Chace disclosed methods for producing copper or copper alloy clad steels. (Nos. 1,755,425; 2,125,153; 2,156,331; 2,169,354; 2,174,733; 2,190,310; 2,193,246; 2,195,613; 2,195,614; 2,199,150; 2,211,922; 2,226 695). These methods generally include casting and rolling.

LEFT

. . Frequent spoon tests verify alloy quality.

° ° °

BELOW

. . Rising slag band is checked by operator.

ing panel, each meter being connected with a hopper containing a particular raw material. One hopper, for instance, may contain powdered ferrochromium; another, powdered ferrosilicon; another, ferromanganese; another ferrocolumbium; another, ferrophosphorus, etc. Practically never is iron powder fed into the working head. The iron constituent for the alloy facing is made up in part from the Fe carried into the system by the ferroalloys, and in part from Fe picked up from the melted portion of the exposed face of the carbon

LEFT

. . Feeding head approaches end of run.

steel slab. There is practically no limit as regards the complexity of alloy constituents that can be metered into the system at one time, although great skill is obviously required in determining metering rates, as each of the ferroalloys carry fractions of various elements into the system, the carbon steel contributes fractions of various elements, and each ferroalloy has a different rate of recovery (although all are high). Slag constituents are fed by hand, as required, into the space between the slab face and the mold wall.

Electrical energy required also varies with the alloy being made, the size of slab being armored, and the speed of operation.

With everything set and controllable from a central panel, the machine is started. The operation is a complex system of synchronized movements with very little personal supervision required. The working head slowly works from the bottom of the slab upward, with alloying elements constantly feeding to the bath underneath the slag. Note that far more than a simple fusing operation with the slab face takes place—a substantial depth of the slab is actually melted off to form part of the bath. This second (or dual) melting of part of the carbon steel is the basis for the name of the process—Pluramelt.

Indicative of the precise operation of the machine is the necessity

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. . Armored ingot as removed from machine. Numbers indicate points of analysis: 1 = 0.062 C, 19.0 Cr, 9.0 Ni; 2 = 0.058 C, 19.1 Cr, 9.1 Ni; 3 = 0.060 C, 19.0 Cr, 9.0 Ni; 4 = 0.060 C, 18.6 Cr, 8.8 Ni; 5 = 0.062 C, 18.5 Cr, 8.6 Ni; 6 = 0.062 C, 18.8 Cr, 8.9 Ni; 7 = 0.060 C, 18.7 Cr, 8.8 Ni; 8 = 0.059 C, 18.6 Cr, 8.9 Ni; 9 = 0.061 C, 19.1 Cr, 8.9 Ni; 10 = 0.062 C, 18.6 Cr, 8.6 Ni; 11 = 0.060 C, 18.8 Cr, 9.0 Ni.

o o o

of gradually changing the pace of upward movement of the working head to offset the gradually rising temperature of the slab face and mold space. The working of the equipment is not a bit spectacular. There are no electrical discharges or pyrotechnics, and no noise—in fact, it is possible to stand on the platform around the mold chamber and be unable to tell whether or not the machine is in operation.

From this description, it is obvious that the Pluramelt process is essentially a precision electric arc furnace, completely mobile within certain prescribed limits, continuously fed with exact predetermined quantities of raw materials which melt to form an alloy steel under a carefully controlled refining and protective slag. That the metering of raw materials is precisely at the rate desired is assured by frequent metal samples dipped from underneath the slag, as shown in the color photo on page 38. These samples are given quick tests which may result in some minor adjustment of metering rates; they then go to the laboratory for complete analysis to record the full history of each armored slab. Slag also is occasionally tested and perhaps altered slightly if the test so dictates. This constant checking during the operation assures the best possible alloy quality.

During the writer's inspection of the Pluramelt machine, carbon slabs 36 in. wide by 14 in. thick by 6 ft. high were being armored with

18-8 stainless steel stabilized with columbium. The machine was making alloy facing at the rate of more than 1 ton per hr., which is certainly a respectable pace for such an operation. Ingots as large as 29 tons have been faced in such a manner, and in fact there is no size limit. However, a combination of finishing mill loads at Brackenridge and consumer demands have resulted in a semi-standardization on the slab size previously mentioned.

The two other color photos on page 38 show the working head approaching the top of the slab. Easily visible is the wide band of hot slag along the slab face. As the working head moves upward there results a progressive feeding and freezing of the alloy metal, and when the machine is turned off at the end of the run, and the metal cools, there is found to be practically negligible piping and segregation. Obviously, therefore, hot top loss is not a factor in this process.

Carbon steel can be faced with practically any ferrous alloy, and commercial composites are being made each week varying from very low straight-chromium armoring to complex nickel-chromium alloys with various trick additive elements. More than one side of the slab can be faced, of course, merely by working on another face during a second run.

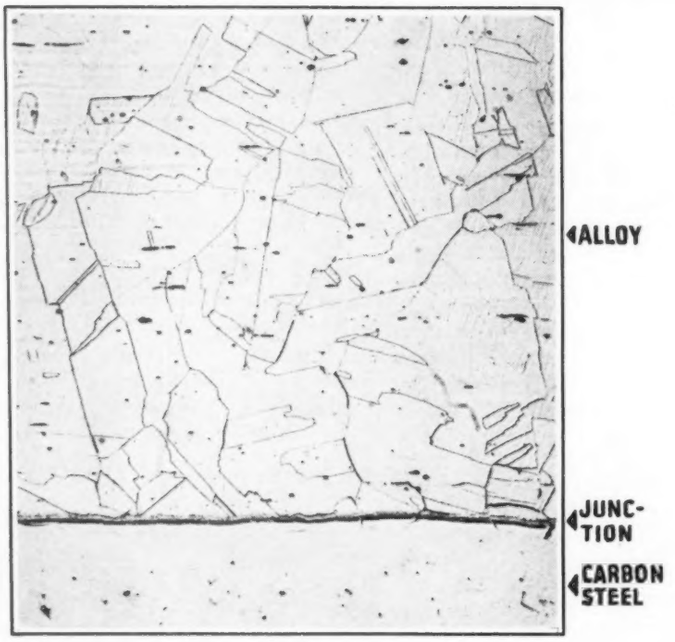
Product Characteristics

So much for the production technique. Next, what about the characteristics of the product?

The question immediately begs for an answer. Since so much of the carbon steel slab face is melted off, the expectation might logically be that the band of interfacial alloys between the carbon steel and outer layer of alloy steel would be quite broad. But such is not the case. The photomicrograph shown on page 40 is pretty typical of all Pluramelt ingots after they are broken down into plate or sheet form and heat treated.

The photomicrograph is at 100

diameters, and includes the junction of a carbon steel base metal and type 304 alloy in Pluramelt plate. The section was previously heat treated by air cooling from 1950 deg. F. Etching of the polished sample was carried out electrolytically in 10 per cent oxalic acid. The austenitic grains in the alloy portion are clearly outlined and carbides are in solution, as was determined by examination at higher magnifications. The austenitic alloy, of course, is typical of type 304. However, note the dark band approximately 0.0005 in. wide at the junction of the alloy and carbon steels. It is thought by some that this band contains carbides, but other authorities believe this effect to be traceable to polishing. If the band does contain carbides, they have no observable effect on fabricating properties of the composite. Furthermore, Pluramelt alloys containing such a band have been in service at high temperatures for many thousands of hours without any evidence of change. Recently a section of type 410 Pluramelt was examined after 11,000 hr. in service at 830 deg. F. There was no widening of the dark band, neither was there migration of carbon into the alloy portion.



. . Junction at 100 diameters. Dark band is 0.0005 in. wide, and may contain carbides. There is no migration of carbon into alloy portion after thousands of hours of high temperature service.

The next question that might arise would be concerned with major segregation or uniformity, being prompted by the fact that the alloying ingredients are being constantly fed into the bath. In a year's commercial operation there have been several messed up batches, traceable to human errors and frailties in general—but, with these few exceptions, the armored ingots have had test samples bored out from all over the surface and progressively in toward the very thin demarcation line, the result always being a uniformity of analysis well within the limits of commercial specifications. The photo on page 39 shows an ingot just as it has been removed from the armoring machine; and, shown on this photo are the locations of a number of points where test borings were made for analysis, the results being indicated in the caption. In fact, even a greater number of test points were used, but to show them all would needlessly mess up the photograph.

The evidence of metal quality coming from the microscopist and the chemist would indicate that physical and corrosion performance

TABLE I

Physical Properties of Carbon Steel Armored With Various Types of Stainless Alloys. (Also, comparative data for carbon and alloy steels alone.)

Alloy Type No.	Test Bar*	Tensile Strength, Lb. Per Sq. In. L	Tensile Strength, Lb. Per Sq. In. T	Yield Point, Lb. Per Sq. In. L	Yield Point, Lb. Per Sq. In. T	Elongation† Per Cent L	Elongation† Per Cent T	Bend
304	C	65,980	67,420	40,420	40,460	29.3	30.6	OK
"	S	60,410	61,080	38,870	37,330	31.0	32.0	OK
"	A	84,090	82,230	45,450	42,310	37.0	48.0	OK
304	C	57,480	56,320	32,910	31,240	35.8	35.6	OK
"	S	52,290	52,200	31,870	31,130	32.0	31.0	OK
"	A	82,160	81,170	40,420	41,150	57.0	60.0	OK
310	C	57,920	56,700	29,450	31,020	39.2	33.0	OK
"	S	47,520	48,020	29,200	31,150	29.0	30.0	OK
"	A	82,140	76,540	38,500	34,060	37.0	46.0	OK
316	C	58,960	61,420	33,200	34,100	42.0	48.0	OK
"	S	53,500	54,740	32,140	34,770	28.4	27.6	OK
"	A	95,380	100,600	42,920	45,550	46.2	51.2	OK
317	C	57,840	63,720	32,220	33,760	43.0	46.0	OK
"	S	52,080	55,470	32,980	35,390	28.0	30.0	OK
"	A	90,640	92,940	43,830	42,630	55.0	57.0	OK
347	C	64,830	65,380	47,000	47,900	30.7	28.7	OK
"	S	61,400	60,980	39,250	37,750	32.0	33.0	OK
"	A	88,140	87,360	51,340	54,220	44.0	37.0	OK
347	C	64,100	63,060	35,270	36,750	35.0	31.0	OK
"	S	48,400	50,060	34,985	34,480	35.0	34.0	OK
"	A	89,620	89,640	47,240	49,660	41.0	40.0	OK
410	C	61,220	60,660	40,520	39,340	25.2	25.5	OK
"	S	60,150	61,300	39,700	38,550	31.0	32.5	OK
"	A	72,570	68,100	42,300	45,260	30.5	29.7	OK
410	C	58,770	59,000	35,620	36,400	28.1	26.3	OK
"	S	54,500	56,250	31,750	32,500	29.2	28.4	OK
"	A	69,350	67,890	41,000	38,400	29.5	30.7	OK
430	C	55,690	57,220	33,980	36,440	28.6	30.2	OK
"	S	48,990	51,880	31,910	34,210	35.0	32.0	OK
"	A	68,430	70,200	42,900	51,050	24.0	23.5	OK
446	C	54,520	55,760	30,690	32,550	34.7	28.0	OK
"	S	49,500	49,170	27,820	28,200	39.0	39.0	OK
"	A	61,520	71,240	40,310	50,770	23.0	21.2	OK

* C = Composite; S = Steel only; A = Alloy only.
† Elongation measured in 8 in. on all thicknesses over ¼ in.; measured in 2 in. on all thicknesses ¼ in. and under.

would likewise be satisfactory. However, complete judgment of the armored steel requires complete testing.

Table I shows the physical properties of a variety of Pluramelt types, comparative data being presented for the composite, the carbon steel alone and the alloy facing alone. In general, the properties of the composite fall somewhere between those of the carbon steel and the alloy steel, which is about what might be expected and certainly satisfactory from a technical standpoint.

Pluramelt composites can be stitched or seam welded with ease, or arc welded with no deterioration at the joint if a certain technique is followed. The sheet edges to be welded are separated a distance equal to the total thickness of the metal. A jig should be used, which consists of parallel clamps along the two edges, which also act as chill plates. Full penetration is achieved with one bead, and the *bead is laid from the armor side.* A higher alloy rod is employed than the alloy armor, to overcome any danger of dilution of the alloy weld metal by the steel back; for instance, if the armor is stabilized 18-8, a 25-20 coated rod would be recommended. If stitch welding is employed, the fabrication is carried out so as to have alloy faces together at the seam, which will result in a completely fused joint.

Arc welds made in the manner described have physical properties comparable with those shown in Table II; these data more than meet the minimum requirements set forth by A.S.M.E. and A.P.I. codes for unfired welded pressure vessels, and it is believed that armored steel will soon be given the green light for this type of application.

TABLE II

Physical Properties of Arc Welded Plate Armored With Various Alloys

Alloy Type No.	Reduced Tensile Bar, Lb. Per Sq. In.	Elongation, Per Cent: Free Bend, Alloy Inside	Elongation, Per Cent: Reverse Bend, Alloy Outside
304	64,000	32.4	50.0
	70,500	38.6	35.6
310	61,300	33.2	36.0
	59,750	36.0	32.0
316	70,500	33.2	32.2
317	70,800	31.7	31.8
347	73,000	33.3	37.0
	70,000	35.0	32.7
	72,500	31.6	30.0
410	68,200	44.0	39.6
	62,500	39.5	32.7
	67,800	43.0	39.4
430	58,700	34.0	37.0
	60,200	33.0	32.0
	59,650	34.2	32.0
446	57,900	33.1	31.7

TABLE III

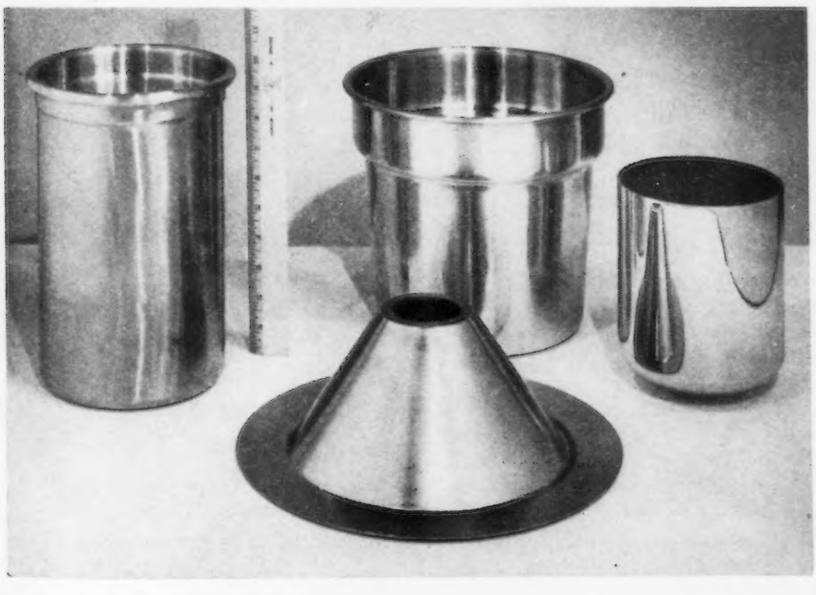
Strauss Test on Alloy Portion of Pluramelt Plates

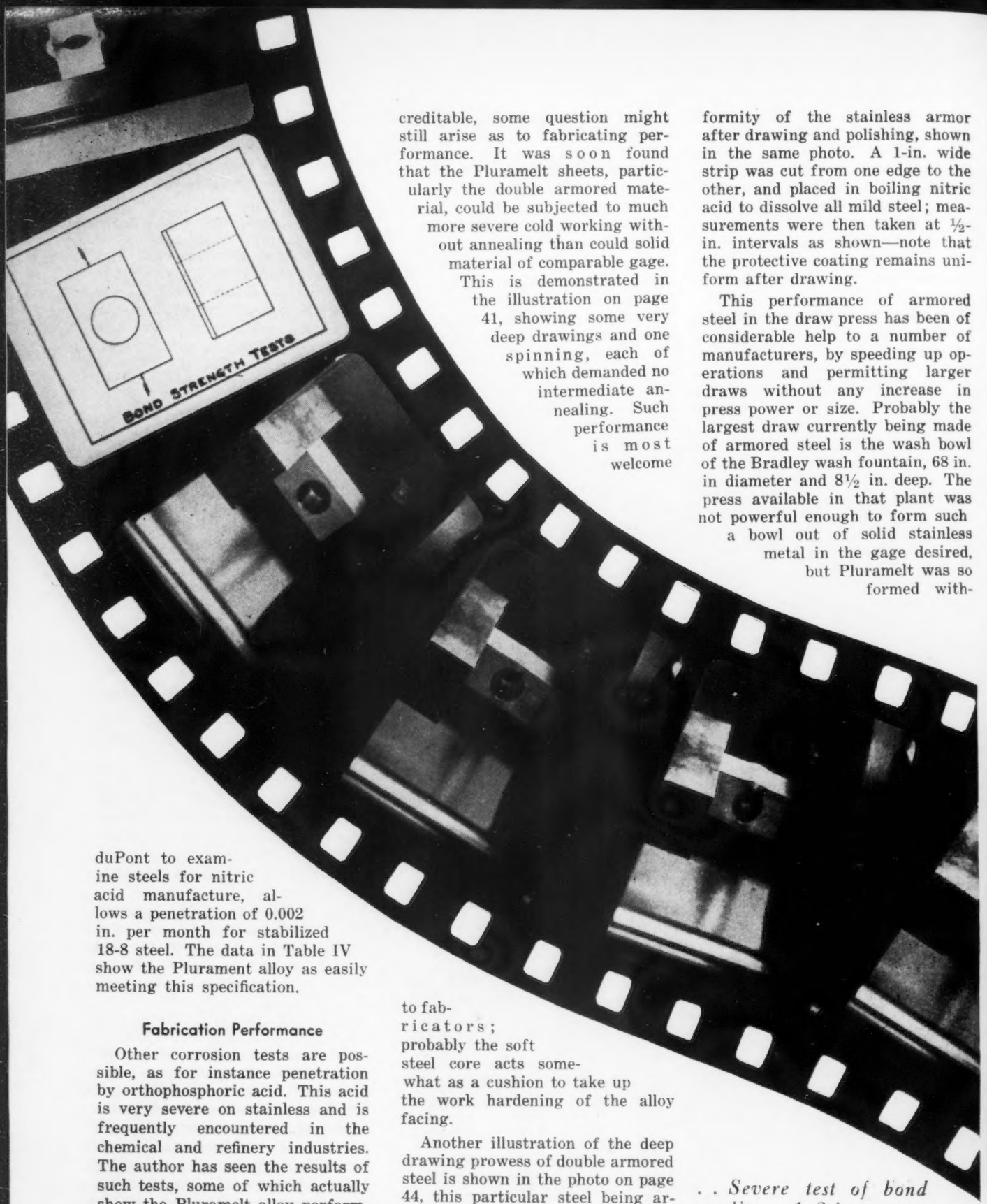
Alloy Type	Heat Treatment*	Alloy Composition	Bend Test After 48 Hr. Boiling in 1 Per Cent $CuSO_4$—10 Per Cent H_2SO_4 Solution
304	1	18-8 S	no fissures
304	1	18-8 S	no fissures
347	1	18-8 Cb	no fissures
347	2	18-8 Cb	no fissures
347	3	18-8 Cb	no fissures
316	1	18-8 Mo	no fissures
316	3	18-8 Mo	slight fissures
316	4	18-8 Mo	no fissures

*1 = 1850 deg. F., air cooled; 2 = 1600 deg. F., air cooled; 3 = 1600 + 1150 deg. F., S.R.; 4 = 1850 + 1150 deg. F., S.R.

The performance of the armored steel in the accelerated tests to determine corrosion resistance is also quite satisfactory. Although no single test can completely evaluate the resistance of stainless to corrosion, the results of the Strauss and Huey tests would be quite indicative. Table III shows the results of the conventional Strauss test (copper sulphate, sulphuric acid) on the alloy portion of the armored plate, to determine the susceptibility of the alloy to intergranular corrosion. The performance is quite adequate; the type 316 shows some small fissures on one test, which is not surprising inasmuch as molybdenum is not a complete stabilizer. The Huey tests, the results of which are shown in Table IV, is probably the most important standard examination of corrosion resistance that can be made. This test, as first applied by Huey at

. . Examples of how steel double armored with 18-8 can be deep drawn and spun without intermediate annealing. Spun oil separator disk is in front; steam table insert (left), Bain-Marie cooking unit (middle), and sample deep drawing (right).





. . Severe test of bond quality. A 2-in. square plate armored 18-8 on one side, with 1-in. hole reamed clean. Motion picture shows test from start to finish—the alloy is ductile and there is no separation.

duPont to examine steels for nitric acid manufacture, allows a penetration of 0.002 in. per month for stabilized 18-8 steel. The data in Table IV show the Plurament alloy as easily meeting this specification.

Fabrication Performance

Other corrosion tests are possible, as for instance penetration by orthophosphoric acid. This acid is very severe on stainless and is frequently encountered in the chemical and refinery industries. The author has seen the results of such tests, some of which actually show the Pluramelt alloy performing better than commercial solid stainless steel. Inventor Hopkins blushes with pride at such data, but he is not inclined to insist that Pluramelt alloy is actually superior to solid commercial alloys.

Even though the physical properties of the armored steel are creditable, some question might still arise as to fabricating performance. It was soon found that the Pluramelt sheets, particularly the double armored material, could be subjected to much more severe cold working without annealing than could solid material of comparable gage. This is demonstrated in the illustration on page 41, showing some very deep drawings and one spinning, each of which demanded no intermediate annealing. Such performance is most welcome to fabricators; probably the soft steel core acts somewhat as a cushion to take up the work hardening of the alloy facing.

Another illustration of the deep drawing prowess of double armored steel is shown in the photo on page 44, this particular steel being armored with 18-8. The utensil is 6 in. in diameter and 7 in. deep, and was fabricated in three draws with no anneals between draws. The maker stated that the same utensil made of solid stainless required four draws with an anneal between the second and third draw. Very important also is the uniformity of the stainless armor after drawing and polishing, shown in the same photo. A 1-in. wide strip was cut from one edge to the other, and placed in boiling nitric acid to dissolve all mild steel; measurements were then taken at ½-in. intervals as shown—note that the protective coating remains uniform after drawing.

This performance of armored steel in the draw press has been of considerable help to a number of manufacturers, by speeding up operations and permitting larger draws without any increase in press power or size. Probably the largest draw currently being made of armored steel is the wash bowl of the Bradley wash fountain, 68 in. in diameter and 8½ in. deep. The press available in that plant was not powerful enough to form such a bowl out of solid stainless metal in the gage desired, but Pluramelt was so formed with-

out any intermediate annealing.

Other applications include innumerable types of cooking utensils, for which service the armored steel has the added advantage of higher heat conductivity because of the mild steel core. Many drums and barrels for food handling, chemicals and paints are now being made of this armored steel, and plates are finding wide application in oil refineries. Large tonnages are going into cans for printers' inks, and, of course, there is a wide use for work table tops, sinks, etc. Because of lack of capacity, strip applications are as yet completely unexplored, but this type of product promises to be a very large tonnage commodity in the future.

New Steel Making Technique

Mr. Hopkins' energies over the past year have been addressed primarily to killing off a few minor production bugs and analyzing fabrication characteristics of the rolled armored (single or double) steel. At all times, however, he is cosseting the idea that this production technique has possibilities far beyond the armoring of carbon steels with various grades of stainless alloys to be broken down into plates and sheets.

The one-year commercial operation of the Brackenridge machine has satisfactorily demonstrated the efficiency of this unit for simple facing operations. Many hundreds of tons of the single or double armored steel are now in kitchen fixtures, utensils and general food handling and processing equipment, oil refining or chemical equipment, tank plates, paint drums, etc. Most likely tough steels will be armored with a variety of very hard steels, the two being rolled down into a shock-resisting light armor plate with file-hard surface — ballistic performances should be such as to promise a variety of applications in Army equipment and in aircraft.

So much for what has been done commercially. As regards carbon strip, armored with stainless or tool steels, no exploitation of this highly attractive outlet has yet even been attempted, mostly because rolling facilities at Allegheny Ludlum are for the time being overloaded. Certainly of interest, however, are the product explorations with an improvised machine at the Kellogg plant in Jersey City. For instance, a number of round carbon steel billets with stainless outside or with a stainless core (or both) have been compounded. Such billets have performed most encouragingly in tube and bar mills and in wire dies. The diversity of such products and their applications are limited only by the ingenuity of design engineers—tubing lined inside or out (or both); wire or bars with a uniform and continuous protective coating, the thickness of the skin controllable from a smear for fencing to an appreciable amount to cope with the rigors of chemical operations, oil and dye processing, etc.; clever specialties, as for instance high carbon steel with wedge-shape facing of stainless, so rolled into knife blades that the blade surface is stainless and the ground cutting edge exposes the tool steel; any number of types and shapes of tough carbon steels faced with tool steels, to be rolled and formed into inexpensive, easily worked and very serviceable cutting, forming and punching dies, etc. All these more-or-less experimental forays are just about what might be expected in view of the dual (or plural) melting and refining characteristics of the Hopkins process. Each of such products can offer so wide a range of physical and corrosion resistant properties as to gladden the hearts of engineers designing consumer goods, capital goods and military equipment. And, the potential savings in strategic materials thus made possible assume particular importance in these days of possible shortages in almost every direction and the likelihood of increasing stringency in the parlous times ahead.

But within recent months a far more dramatic role has been envisaged for the Hopkins process

TABLE IV

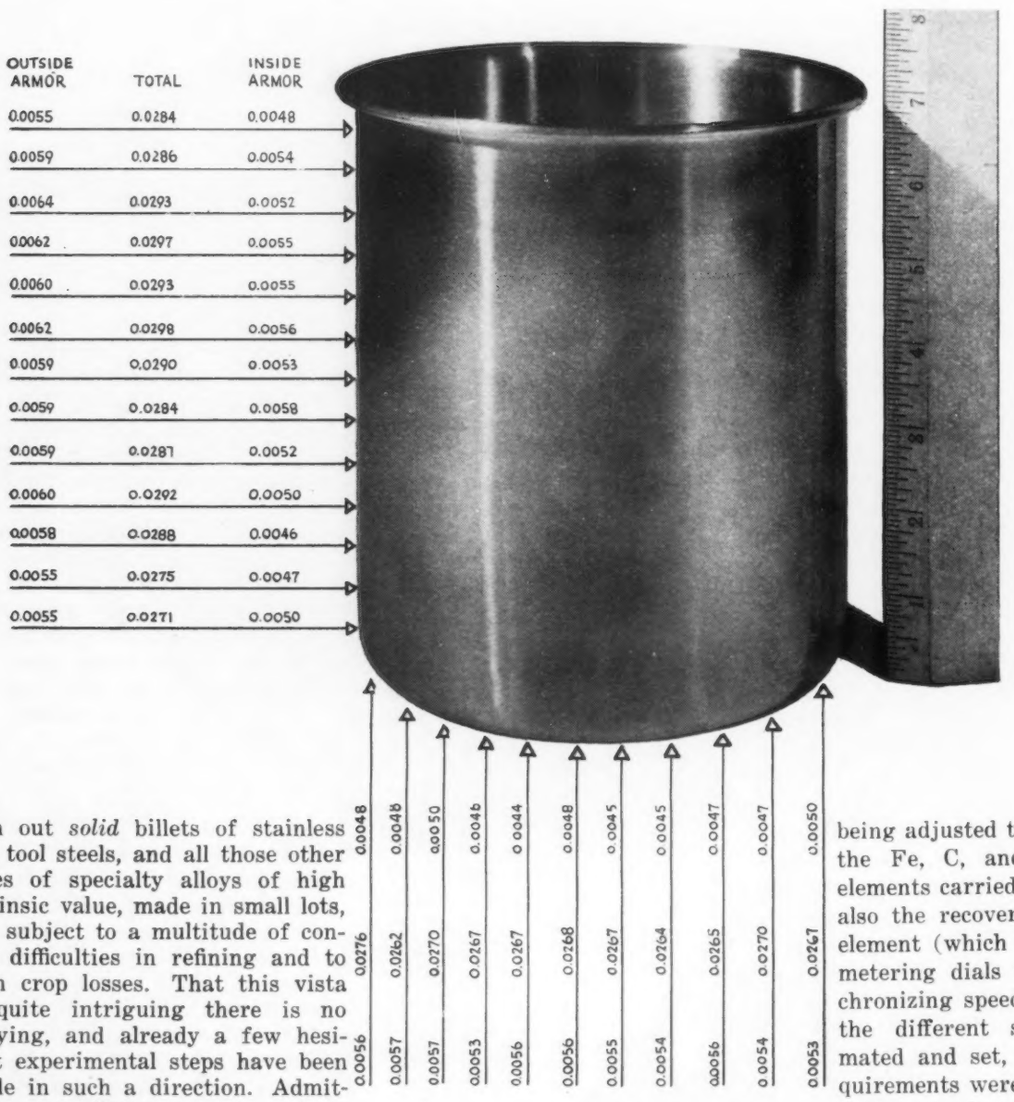
Boiling 65 Per Cent HNO_3 (Huey) Tests on Alloy Portion of Pluramelt

Alloy Type	Heat Treatment*	Alloy Composition	Inches Penetration Per Month				
			First 48 Hr.	Second 48 Hr.	Third 48 Hr.	Fourth 48 Hr.	Fifth 48 Hr.
304	1	18-8S	0.00075	0.00055	0.00064	0.00052	0.00052
304	1	18-8S	0.00093	0.00077	0.00116	0.00120	0.00157
310	1	25-20	0.00043	0.00045	0.00076	0.00108	0.00128
316	1	18-8 Mo	0.00079	0.00073	0.00074	0.00080	0.00090
347	1	18-8 Cb	0.00051	0.00034	0.00029	0.00028	0.00029
347	2	18-8 Cb	0.00052	0.00039	0.00046	0.00054	0.00064
347	3	18-8 Cb	0.00062	0.00065	0.00087	0.00107	0.00144

* 1 = 1850 deg. F., air cooled; 2 = 1600 deg. F., air cooled; 3 = 1600 deg. F. + 1150 deg. F., S.R.

than the facing operations described herein. As the quantities of test data were digested, the realization grew that this process is conceivably an efficient primary producer of steel—the alloy steels are controllable to within very narrow limits and are of very high and uniform quality; furthermore, ingot piping and crop losses almost approach the negligible.

Why then not use the process to turn out *solid* billets of stainless and tool steels, and all those other types of specialty alloys of high intrinsic value, made in small lots, and subject to a multitude of control difficulties in refining and to high crop losses. That this vista is quite intriguing there is no denying, and already a few hesitant experimental steps have been made in such a direction. Admittedly, not all the steps have been huge successes, but the proportion of encouraging results has been such as to demand additional investigation. Hopkins' set-up of melting and feeding (of raw materials) units can be operated in a water-cooled copper mold, or refractory mold — the shape either may be round, square, rectangular, or what shape or size considered most efficient for subsequent rolling or forging operations. The resulting steel billet or slab has practically no pipe, therefore, yields are of the order of 90 per cent. Analyses are very uniform. And, while the molten metal in the Hopkins machine so far has been found to cost a fraction more than molten metal in conventional practice, the yield is so high and the product is so far along the path to a finished article, that final costs can quite conceivably run in favor of the Hopkins metal.



Just recently the first test run on special steels was carried out at the instigation of an independent tool steel producer. The producer dished up no mean task—he requested four steels of the following analyses:

	Grade 2	Grade 8	Grade 20	Grade 47
C	1.45 - 1.60	0.90 -0.95	0.95 -1.04	0.95 -1.10
Mn	0.35 - 0.40	1.50 -1.60	0.15 -0.30	0.20 -0.40
Si	0.20 - 0.40	0.10 -0.25	0.15 -0.30	0.10 -0.35
W	.....	.....	.....	3.5 -4.0
Cr	11.00 -12.50	.....	0.10 max.	0.40 -0.60
V	0.20 - 0.30	.....	0.05 -0.08	.....
Mo	0.70 - 0.85	0.25 -0.30	.....	.....
P	0.025 max.	0.020 max.	0.015 max.	0.025 max.
S	0.025 max.	0.020 max.	0.015 max.	0.025 max.

Based on past experience with stainless alloys, calculations were carried out to determine the metering of raw materials into the mold for each of the four steels, i. e., how much powdered ferromanganese, ferrosilicon, ferrochrome, ferrovanadium, ferromolybdenum, ferrophosphorus, sulphur, iron and slag constituents were to be fed into the work chamber each minute, each constituent of course being adjusted to take into account the Fe, C, and traces of other elements carried into the mold, and also the recovery of each alloying element (which is very high). The metering dials were set, the synchronizing speeds (which vary for the different steels) were estimated and set, and the power requirements were calculated. Everything was then turned on, and the machine went its quiet way to build up a square billet. The output of commercial machines of this type could be stepped up by employing specially designed battery units.

The table (next page) shows what results were obtained for each of the four steels. The analyses (1), (2), (3), (4) were made at center, outside, top and bottom of the ingot, and for some of the

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. . Three draws (6 in. diameter, 7 in. deep) with no intermediate anneal. Figures indicate thickness of inner and outer armor and steel core at various points.

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grades only analyses of critical elements were carried out.

		Grade 2	Grade 8	Grade 20	Grade 47
C	1	1.52	0.97	0.99	0.73
	2	1.48	0.94	0.99	0.72
	3	1.49	0.98	0.99	0.64
	4	1.47	0.98	0.99	0.64
Mn	1	...	1.66	...	...
	2	...	1.63	...	...
	3	...	1.66	...	...
	4	0.42	1.66	0.23	0.17
Si	1	...	...	...	...
	2	...	...	...	...
	3	...	...	...	...
	4	0.31	0.11	0.20	0.66
W	1	...	...	...	4.23
	2	...	...	...	4.29
	3	...	...	...	4.20
	4	...	...	...	4.18
Cr	1	11.70	...	...	...
	2	11.63	...	...	...
	3	11.78	...	...	...
	4	11.74	...	0.04	0.58
V	1	...	...	...	...
	2	...	...	...	...
	3	...	...	...	...
	4	...	...	...	...
Mo	1	0.81	0.33	...	...
	2	0.79	0.33	...	...
	3	0.81	0.32	...	...
	4	0.80	0.33	...	...
P	1	...	...	...	...
	2	...	...	...	...
	3	...	...	...	...
	4	...	0.014	0.012	...
S	1	...	...	...	...
	2	...	...	...	...
	3	...	...	...	...
	4	...	0.016	0.020	...
Ni	1	...	...	...	...
	2	...	...	...	...
	3	...	...	...	...
	4	...	...	0.04	...

For the most part, these results are surprisingly good, thanks to the process and the skill in calculating the input of raw materials. It should be noted that the chemical analyses are quite consistent and close to specified ranges, *except* for Grade 47. This particular alloy obtained its tungsten from granulated tungsten ore, and the calculation of quantity metered each minute was based on a loss of silicon for reduction. However, what actually occurred was a preferential loss of carbon, the result being that silicon is high and carbon is far too low in the finished steel. A subsequent heat, with tungsten ore and ferrosilicon recalculated, came very close to specification—the recovery of tungsten is very high and use of ore has no effect on the cleanliness of the steel. A third heat, made with ferrotungsten, has worked out even better. None the less, it must be pointed out that all three heats have shown considerable variation in tungsten in the billet. The belief is, however, that this difficulty with tungsten can easily be ironed out as additional heats are made. But, all things considered, it is difficult to deny that these trials were surprisingly good for first runs.

Each ingot of the four tool analyses hot worked beautifully, with no cracks. Extensive tests showed the steel in most respects equal to similar steels made by conventional methods. Grade 20 has consistently been the best, although Grades 8 and 2 have been very promising. Ingot grinding losses were not severe, and the finished bar recovery has been in the neighborhood of 88 per cent, as compared with a recovery of about 76 per cent for the best of regular manufacturing practice.

These tests and a few others made within the past several weeks may prove nothing as regards the future metallurgical and competitive status of the Hopkins machine as a primary producer of alloy billets. Results to date, however, are far more encouraging than first runs on new processes usually are. A fair appraisal will require at least another year of experimentation, and after that interval a reexamination of the machine will be in order.

Every day this continuously fed, accurately controlled, flexible and mobile "electric furnace" is demonstrating its ability to turn out a high-grade, versatile and competitive commercial product that is constantly exploring new and unexpected consumer outlets. (Carbon steel faced on one side with stainless sells for substantially less than solid stainless; double armored carbon steel currently sells for about the same price as solid stainless.) There is ever the possibility that the process may parlay its way into the highly competitive, highly arcane production field of solid stainless, tool and special steels. Industry has in this equipment a radically different and tantalizing production tool to meet the ever-more-difficult and ever-changing demands of large industries and casual consumers. Mr. Hopkins, who isn't a steel man and therefore not subject to the multitude of do's and dont's and better-not's so prevalent in the industry, has waded in where most steel men have hesitated to tread. He has presented the steel industry with an adolescent which may well mature into an adult capable of demanding respectful recognition by the elder techniques — the open hearth, the electric furnace, and the bessemer converter.

41 Lessons in ARC WELDING

—Continuation of a series of lessons to enable beginners to master the fundamentals of bare and shielded-arc welding techniques.

LESSON No. 9: *Object is to weld together two 3/8 in. plates using a single bevel butt joint.*

Apparatus used is Flex Arc welding machine, chisel, hammer and wire scratch brush. Material used is two 3/8 in. thick plates, 3 in. wide and 6 in. long, one of which contains a 45 deg. bevel along one end, and 5/32 in. diameter Flex Arc welding electrodes.

INSTRUCTIONS: A single bevel butt joint is a joint design of such a type that all welding may be done from one side of the plates and only one plate is beveled, as shown in Fig. 21. Such a design presents greater welding problems than the single vee type because it is not as wide and because one side of the joint is at right angles to the plate surfaces. It has the advantage, however, in requiring less weld metal to fill the joint.. Because of the narrow included-angle of the joint it is important that the root of the joint be spaced 1/8 in. (See Fig. 21a.)

Three layers are required to fill and reinforce a single bevel joint between 3/8 in. plates. A string bead should be used to deposit the first layer and a weaving procedure to deposit the other layers. (See Fig. 21b.)

PROCEDURE: Set the polarity reversing switch on straight polarity, adjust the welding current to 150 amp. and clamp the plates to be welded flat on the welding table, being sure to space the joint 1/8 in. as shown in Fig. 19a. If clamps are not available, tack weld the plates together at each end of the joint.

Weld the plates together by using three passes, as previously discussed. Carefully clean all spatter, scale and oxide from each layer before the next one is deposited. Be careful to obtain complete fusion at all times. Inspect each pass for uniformity of appearance and try to improve the appearance as the weld progresses.

After the joint is completed have the instructor inspect it for appearance. Following the instructor's inspection make a nicked groove on the top layer near the vertical fusion zone of the joint, as discussed in Lesson No. 8, and fracture the specimen. The exposed fracture should show sound uniform weld

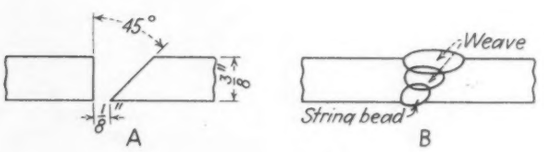


FIG. 21—Preparation of plate for single bevel butt joint.

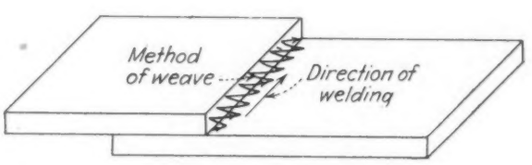
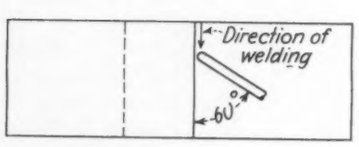


FIG. 23—Electrode may be weaved in this manner.



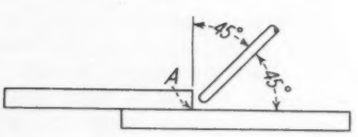


FIG. 22—Position of electrode for fillet welds.

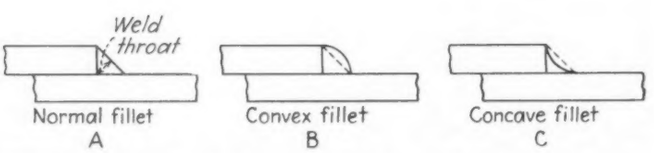


FIG. 24—Strength of fillet weld is determined by the throat section.

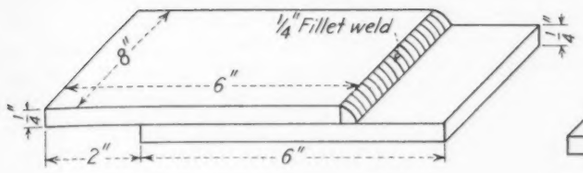


FIG. 25—Make and fracture a lap welded test specimen of this type.

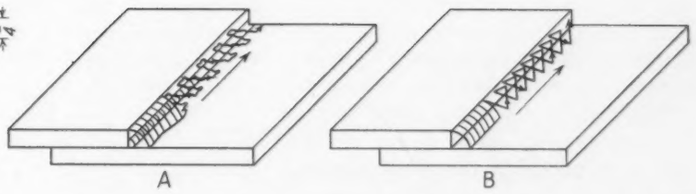


FIG. 26—Method of making fillet weld between two overlapping horizontal plates.

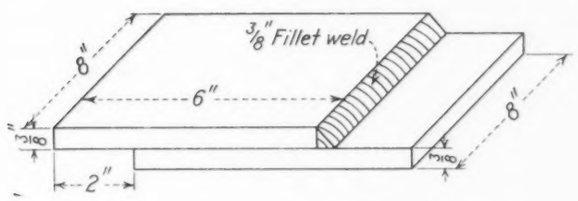


FIG. 27—Type of test plate for fillet weld between overlapping horizontal plates.

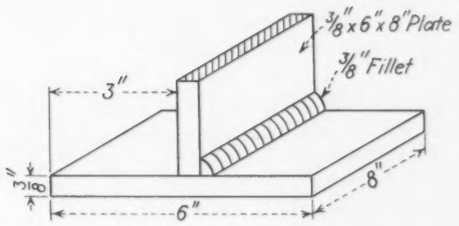


FIG. 28—Test tee weld to be subsequently fractured and examined.

metal free from gas pockets, slag inclusions, poor fusion and incomplete penetration.

Repeat this exercise until a satisfactory butt weld of this design can be made.

LESSON No. 10: *Object is to make a fillet weld in the horizontal position between two lapped plates.*

Apparatus used is Flex Arc welding machine, chisel, hammer and wire scratch brush. Material used is two ¼ in. plates, and 5/32 in. diameter welding electrodes.

INSTRUCTIONS: In the construction of welded apparatus, plates are often lapped and welded together by fillet welds. The procedure for making such fillet welds varies with the size of the weld. In this lesson it is intended to study the method of making single pass ¼ in. welds. (The method of making larger welds will be discussed in later lessons.)

The electrode should be held at an angle bisecting the edges of the plates to be welded and pointed backward toward the weld, as shown in Fig. 22.

The electrode may be weaved slightly, as shown in Fig. 23, so as to build the metal upon the vertical surface and widen the area of fusion on the horizontal surface. Care must be taken to obtain complete fusion at the root of the weld (point A, Fig. 22) and prevent roll and overlap on the horizontal surface. Too high a welding current may cause the vertical surface to melt away at the top thus resulting in an undersize fillet.

The strength of a fillet weld is determined from the throat section (see Fig. 24a). As a result it is desirable that the cross-section of the weld be similar to that of a right triangle (Fig. 24a). A convex weld as shown in Fig. 24b is permissible providing it is not excessive. A concave weld should not be made unless it is possible to increase the length of the weld legs to make the throat section equivalent to that of a normal fillet weld. This can only be accomplished if the top plate being welded is larger than the size of the weld.

The arc should be held a little shorter than is the case when making beads or butt welds in order to obtain fusion at the root of the weld and to obtain better control of the deposited metal.

PROCEDURE: Set the polarity reversing switch on straight polarity, adjust the welding current to about 150 amp. and lap two ¼ in. plates over each other and tack weld together.

(1) Make a ¼-in. fillet weld along the joint by using the procedure outlined. Make the weld uniform in appearance and size. Try to make a normal type weld. Concave fillet welds are not permitted in this test.

After the weld is completed, fracture it by prying the plates apart. The fractured surface must show complete fusion and the absence of blow holes and slag inclusions.

Repeat this exercise until a satisfactory weld can be made.

(2) After it is possible to make a satisfactory ¼ in. lap weld, make and fracture a lap welded test specimen as shown in Fig. 25.

LESSON No. 11: *Object is to make a ⅜ in. fillet weld between two overlapping horizontal plates.*

Apparatus used is Flex Arc welding machine, chisel, hammer and wire scratch brush. Material used is two ⅜ in. plates, and 5/32 in. diameter welding electrodes.

INSTRUCTIONS: The deposition of a ⅜-in. fillet weld to join two overlapping plates can be done in two ways: by making the weld in a single pass, and by making the weld in two passes. The two-pass procedure is generally recognized as the preferred procedure because it insures better fusion, appearance and uniformity. This is especially true for the beginner.

In a two-pass ⅜ in. fillet weld the first bead is deposited as a string bead by moving straight down the joint without weaving. Care must be taken to insure complete fusion at the corner. The second pass is deposited over this string bead by weaving in the man-

ner shown in Fig. 26a. Be sure to pause momentarily at the top of the weave to properly build up the metal on the vertical surface. The electrode should be pointed as discussed in Lesson No. 10.

The single pass 3/8-in. fillet weld is made by weaving in such a manner as to complete the weld in one pass along the joint. The proper weave to use in this case is shown in Fig. 26b. Special care must be taken to obtain good fusion at the root of the weld. This is sometimes a difficult problem because of the large volume of molten weld metal that must be carried with this procedure.

PROCEDURE: Set the polarity reversing switch on straight polarity, adjust the current to about 150 amp., overlap two 3/8 in. plates on the welding table and tack weld the plates together.

(1) Make a 3/8-in. fillet weld between lapped plates by using two passes. Fracture the weld and examine for soundness and complete penetration and fusion. Repeat until a satisfactory weld can be made.

(2) Make a 3/8-in. fillet weld between lapped plates by using a single pass. Fracture the weld and examine for soundness and complete penetration and fusion. Repeat until a satisfactory weld can be made.

(3) After satisfactory welds can be made by both methods, make a test plate, as in Fig. 27, by using two passes. The weld must have a good appearance and must reveal sound metal and complete fusion when fractured.

LESSON No. 12: *Object is to make a tee joint in the horizontal position with a fillet weld.*

Apparatus used is Flex Arc welding machine, chisel, hammer and wire scratch brush. Material used is two 3/8-in. steel plates, and 5/32-in. diameter electrodes.

INSTRUCTIONS: A tee joint consists essentially of two plates placed at right-angles to each other in such a manner that they resemble the letter tee. Butt or fillet welds may be used to join the plates together, but this lesson considers only the fillet weld. The particular design of the joint is such that the weld is applied in the center section of one plate and at the edge of the other. As a result there is danger of one plate becoming overheated in an effort to obtain proper fusion to the other. When making a tee weld, therefore, special care must be taken by the welding operator to concentrate the arc longer on one plate than the other.

A short arc should be used, with special care being taken to obtain good fusion at the root of the weld. The plate containing the weld at the edge must not be overheated, as this may produce undercutting at the vertical toe of the weld. The weave of the electrode should be similar to that studied in making lap welds. For fillet welds larger than 5/16 in. two passes are recommended.

PROCEDURE: Set the polarity reversing switch on straight polarity, adjust the welding current to about 150 amp., tack weld two 3/8-in. plates at right-angles to each other to form a tee weld and securely ground them to the welding table.

Weld the plates together with a 3/8-in. horizontal fillet weld by using two passes. Take special care to obtain good fusion and to prevent undercutting. Fracture the weld and examine for good fusion, complete penetration, slag inclusions and gas holes.

Repeat this exercise until a satisfactory tee weld can be made, then make a test plate, as shown in Fig. 28, by using two passes to make the 3/8-in. fillet weld.

Have the instructor inspect the weld for appearance and undercut. If the appearance is satisfactory fracture it and examine for fusion, penetration and soundness.

If any flaws are present in the fractured surface another test plate should be made.

Ed. Note:—These lessons will be continued next week.

New Mobile Crane by Osgood

THE Osgood Co., Marion, Ohio, announces its new Mobil-Crane, a one-man, one motor, pneumatic tired machine for material handling.

The Mobil-Crane is not a truck crane. No tracks or special preparation are required to move the machine. It will travel in a storage yard wherever an industrial truck will go. It has four speeds, forward and backward, and will lift and carry loads up to 15 tons, and swing its load in a full circle. Speeds up to 5 miles per hr. with load can be obtained.

The Mobil-Crane shown herein is setting an 80 ft., 9500-lb. stack, an operation requiring precise control, and reserve strength and power. Booms of 45, 50, and 55 ft. are standard, but longer booms can be furnished for special requirement. It can be equipped to load and unload any kind of material, with hook, sling, magnet, or clamshell bucket.

Screw jacks relieve the tires when making heavy lifts. Hydraulic jacks are available. Outriggers with screw jacks give the machine greater stability when working over the side. Also, two jacks over the front axle keep the upper body on an even keel at all times.

Steering is accomplished by hydraulic control, and the machine may be turned in a 50-ft. radius. Front and rear wheels are equipped with air brakes of the internal expanding type, affording maximum safety when traveling on the highway.

The tandem rear wheel assembly is mounted in a large bearing bolted to the frame, and has a knee-action effect when traveling over obstacles. This is said to keep the upper body level at all times, and relieves the frame of twisting strains.

Aluminum Castings for Aircraft

By NORMAN E. WOLDMAN, Ph.D.
Chief Metallurgical Engineer, Eclipse Aviation Division of Bendix Aviation Corp., Bendix, N. J.

—The types, properties and applications of permanent mold, die cast and plaster mold commercial castings employed in aircraft structures. Part I, last week, dealt with sand castings.

MANY of the sand cast aluminum alloys can be successfully cast in permanent molds, but in other cases special alloys have been developed for this purpose. Permanent mold castings have the advantage over sand castings in greater strength and ductility, more exact size and better surface. They also have lower cost of production, when the quantity is sufficiently great to discount the initial cost of the mold. They are thus the most metallurgically desirable type of aluminum alloy castings. Permanent mold castings[3] are used where a superior product is required, or when a forging cannot be used, either because of the form of the part or because of cost considerations. The strength of a casting produced from a given alloy in a permanent mold is about 20 per cent greater than that obtained from a sand casting, and the hardness and ductility are correspondingly greater. The dimensions may be controlled more accurately than in a sand mold casting, and either a machined or polished surface will generally show greater freedom from porosity. By the use of permanent mold castings it is often possible to effect appreciable saving in weight due to the ability to design to closer limits.

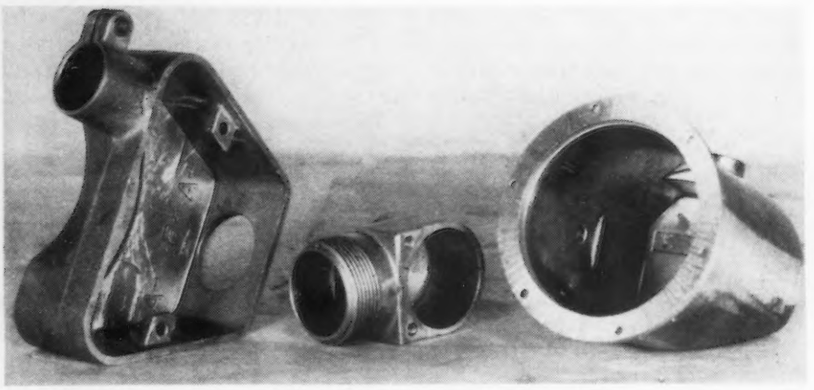
In addition to superior mechanical properties possessed by permanent mold castings, the alloys have greater resistance to corrosion and greater susceptibility to heat treatment where this process is applicable, due to the fine grain and greater density of the metal.

The molds should be made of close grained low phosphorus gray cast iron. The less complicated cores for permanent molds can be advantageously made of high speed steel. For complicated cores, dry sand can be used, and the molds are then known as "semi-permanent." When casting in permanent molds, it is necessary that the molds should be hot. If castings are made in cold molds, they are usually found to be cracked and are, therefore, useless. The best results are usually obtained at temperatures of about 750 deg. F. The metal is poured into the mold by gravity feed. Although the mold is hot, the molten metal is chilled rapidly and the casting is dumped out while still at high temperature. That is, when metal cores are employed, it is necessary to withdraw them just as soon as the casting has set sufficiently, and before solidification shrinkage is complete, otherwise cracks are likely to occur in the casting because of the hot-shortness of practically all aluminum casting alloys. The molds are poured so that the portion of the casting farthest from the gate solidifies first; this allows the casting to be fed as the metal sets and thus prevents the formation of shrinkage cavities.

Permanent mold castings, depending on size and design, can be cast with 3/32-in. minimum wall thickness. The overall dimensions can usually be held to ±0.010 in. Usually 1/32 in. is allowed for machining.

The well-known aircraft permanent mold castings are: Alcoa 43, Alcoa A108, Alcoa 122, Alcoa A132, Alcoa 142, Alcoa B195, Alcoa 355,

[3] Streeter and Faragher, Mechanical Engineering Journal, May, 1925.



A TERMINAL housing aluminum die casting (left) made from Eclipsaloy 307 (Alcoa 85); (center) terminal shield aluminum die casting made from Eclipsaloy 307 (Alcoa 85); (right) a turn-and-bank indicator cover aluminum die casting made from Eclipsaloy 307 (Alcoa 85).

and their A.S.T.M. or S.A.E. equivalents. Other manufacturers use their own trade names for these alloys.

The composition, properties and commercial equivalents of various permanent mold aluminum casting alloys are shown in Table V. The uses and characteristics of these alloys are listed below:

ALCOA 43:

See information under sand castings.

ALCOA A108:

Combines desirable characteristics of both the silicon-aluminum and the copper-aluminum alloys.

ALCOA 122:

Brake shoes, bearing caps, pistons, camshaft bearings, where high hardness and good bearing properties are required.

ALCOA A132:

Has lowest coefficient of expansion and lowest weight. Possesses excellent bearing and wearing qualities. Used for brake shoes, bearing caps and engine pistons.

ALCOA 142:

Pistons, brake shoes, air cooled cylinder heads.

ALCOA B-195:

Pistons, bearings caps, and wherever Alcoa 195 sand castings are used.

ALCOA 355:

See information under Alcoa 355 sand castings.

Die Castings

The die casting process is adapted to the production of castings in which extreme accuracy, uniformity, and superior finish are essential. In this process very thin walls may be cast, with a consequent saving of weight in the finished part. Holes may be cast to very close tolerances and the dimensions can be controlled so closely as to reduce machining operations to a minimum. Because of the excellent surface, polishing and finishing operations are greatly simplified. In this case the die cost is such that the die-casting process is suitable only for castings which are produced in large quantities. The great advantage of the die-casting process is that it makes possible rapid production of castings which are substantially exact duplicates of each other.

Die castings are made by forcing molten metal under pressure into water-cooled metal dies. In the plunger type machine the metal is forced into the die by means of a cylinder and piston which are submerged in the molten metal; while in the air-operated machine the metal is forced into the die by air at high pressure on the surface of the molten metal in the gooseneck reservoir. In the press casting process (Harvill Process) a roughly measured quantity of almost semi-molten metal is poured from a ladle into a cylinder and is immediately forced into a die by a plunger or ram mounted on a power press. A pressure of about

TABLE V

Composition, Properties and Commercial Equivalents of Permanent Mold Casting Alloys

COMPOSITION (Typical):

	Cu	Si	Fe	Mg	Ni	Al
Alcoa 43	...	5	..	..	..	balance
Alcoa A108	4.5	5.5	..	..	..	balance
Alcoa 122	10	...	1.2	0.2	..	balance
Alcoa A132	0.8	12	0.8	1	2.5	balance
Alcoa 142	4	...	..	1.5	2	balance
Alcoa B195	4.5	2.8	..	..	..	balance
Alcoa 355	1.2	5	..	0.5	..	balance

PROPERTIES (Typical):

Alcoa	Tensile Strength	Elongation, Per Cent	Brinell Hardness
43	21,000	2.5	40
A108	24,000	0.5	70
122-T52	30,000	0.0	105
122-T65	40,000	0.0	140
A132-T4	34,000	1.0	100
A132-T551	31,000	0.0	105
142-T61	40,000	0.0	110
142-T571	34,000	0.0	105
B195-T4	33,000	4.5	75
B195-T6	35,000	2.0	90
355-T6	37,000	1.5	95

NOTE: Data taken from Aluminum Co. of America publications.

COMMERCIAL EQUIVALENTS:

Alcoa	S.A.E.	Army	Navy	Federal
43	35	....	No. 46-A-15 Cl. 7	QQ-A-596 Cl. 7
A108	....	....	No. 46-A-15 Cl. 5	QQ-A-596 Cl. 5
122	34	....	No. 46-A-15 Cl. 2	QQ-A-596 Cl. 2
A132	321	....	No. 46-A-15	QQ-A-596
142	39	....	No. 46-A-15	QQ-A-596
B195	....	....	No. 46-A-15	QQ-A-596
355	322	....	No. 46-A-15	QQ-A-596

4000 to 12,000 lb. per sq. in. causes the molten metal to fill all parts of the hardened steel die. Pressure and chilling action results in homogeneous, fine grain castings. Due to the rapid chilling much air can be entrapped with subsequent porosity. All die castings are therefore subject to interval porosity and consequently do not possess high impact strength and ductility.

Sections in die castings can be produced as thin as 0.030 to 0.040 in., although 1/16 in. is preferred. A section tolerance of ± 0.0025 in. can be held.

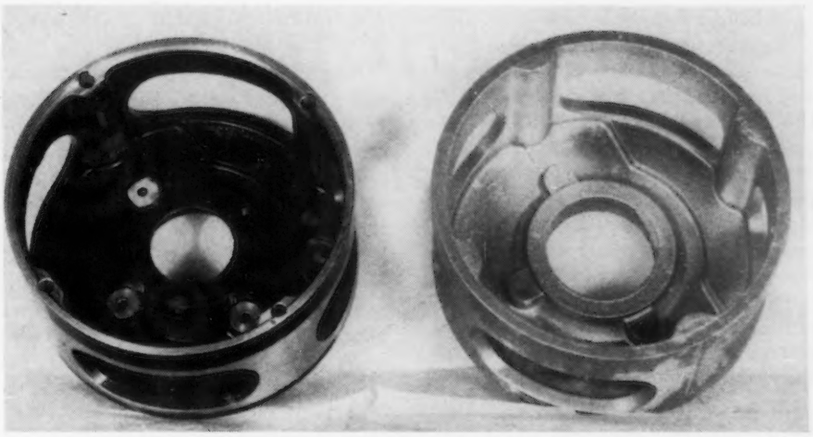
Due to the fine grain and dense structure in die castings a higher corrosion resistance than that for sand castings is obtained.

The more common aircraft die casting alloys are: Alcoa 13, Alcoa 43, Alcoa 85, Alcoa 218 and their A.S.T.M. or S.A.E. equivalents. Other manufacturers use their own trade names for these alloys. For detailed data on compositions, properties, etc., see Table VI.

ALCOA 13:

It has good casting qualities, highest fluidity and freedom from hot shortness. It has very high strength and good corrosion resistance. It is used for housings, instrument and accessory parts, bomb-rack anchors, air intake check valves, and large intricate castings.

[4] Dix, American Institute of Mining and Metallurgical Engineers, Publication 616, 1935.



AN Eclipse generator front head permanent mold casting made from Eclipsaloy 38B-STA. One view is the finish machined and black enameled casting; the other view is the sand blasted raw casting.

ALCOA 43:

See information in paragraphs dealing with sand castings and permanent-mold castings.

ALCOA 85:

It has good casting qualities and gives good combination of strength and ductility. It is used for housings, instruments and accessory parts, cockpit inclosure parts, deicing manifolds, brackets and parts of heavy section.

ALCOA 218:

It has excellent resistance to corrosion and excellent strength and ductility. It does not cast as well in intricate castings as Alcoa 13 alloy. It is used for fittings and castings requiring high strength and resistance to corrosion.

Within the limits employed[4] in the die casting alloys, nickel and zinc appear not to affect the mechanical properties of the high-silicon alloys. Copper increases the strength and reduces the elongation; iron reduces the elongation, and if extremely high, may reduce the tensile strength; while tin lowers both the strength and elongation. The silicon-aluminum alloys are definitely more corrosion resistant than those containing appreciable amounts of copper. It is possible to produce aluminum die castings of superior corrosion resistance to those heretofore produced by the control of impurities in the 12 per cent silicon alloy within commercially obtainable limits. All the common impurities in the 12 per cent silicon alloy, except iron, at least slightly affect the corrosion resistance, copper and tin appearing most undesirable. It is particularly fortunate that iron, the least controllable impurity in die castings has no detrimental effect on the corrosion resistance within the maximum range likely to be encountered. Iron is difficult to control in the alloy.

Die castings are not widely used for highly stressed parts. Their chief utility is for lightly stressed or virtually unstressed parts.

Plaster Mold Castings

Plaster mold castings are obtained from molds made by pouring a liquid mixture of gypsum (calcium sulphate), water and suit-

TABLE VI

Composition, Properties and Commercial Equivalents of Die Casting Alloys

COMPOSITION (Typical):

	Cu	Si	Mg	Al
Alcoa 13	..	12	..	balance
Alcoa 43	..	5	..	balance
Alcoa 85	4	5	..	balance
Alcoa 218	..	..	8	balance

PROPERTIES (Typical):

Alcoa	Tensile Strength	Yield Strength	Elongation, Per Cent	Brinell Hardness	Charpy Impact	Endurance Limit
13	33,000	18,000	1.8	80	2.0	15,000
43	29,000	13,000	3.5	65	4.5	...
85	35,000	19,000	2.7	70	2.5	17,000
218	36,000	23,000	5.0	..	10.0	17,000

COMMERCIAL EQUIVALENTS:

Alcoa	S.A.E.	Army	Navy	Federal
13	305	57-93-1B Gr. 2	46 A-14 Cl. 1 & 2	QQ-A-591 Cl. 1 & 2
43	304	57-93-1B	46 A-14 Cl. 3 & 8	QQ-A-591 Cl. 3 & 8
85	307	57-93-1B Gr. 1	46 A-14 Cl. 5	QQ-A-591 Cl. 5
218	...	...	46 A-14 Cl. 7	QQ-A-591 Cl. 7

able binder, such as asbestos, into a flask containing the metal pattern. The molds are allowed to set and harden, then are removed from the flask and baked at 1400 to 1500 deg. F. to completely calcine and dry, leaving it very porous to allow gases to escape. The cores are made in the same fashion as the molds. Castings made by this process can be held to tolerances of ±0.005 in. and better. The surfaces are almost as smooth as metal mold castings. Many aluminum casting alloys can be cast by this process.

Protection from Corrosion

In contact with moist air aluminum alloys quickly acquire a thin, impervious film of aluminum oxide, which serves as a protective barrier against further attack. A thicker oxide film can be formed electrolytically where greater resistance to corrosion is required. This is almost mandatory for all aluminum alloy parts for aircraft, especially for naval aircraft.

There are two recognized methods commonly used today for electrolytic anodic oxidation (anodizing) of aluminum, namely, the chromic acid anodizing process and the sulfuric acid (Alumilite) anodizing process.

The process using chromic acid electrolyte can be used on aluminum alloys containing less than about 5 per cent copper. The castings are suspended by means of aluminum wire and immersed in a 5 to 10 per cent chromic acid solution. The castings are connected to the positive pole of the electroyltic circuit and current is passed through at 45 volts for 30 to 60 min. while the temperature of the bath is maintained at 95± 2 deg. F. This produces an aluminum oxide film on the surface, which film is capable of resisting the attack of a 20 per cent salt spray solution for over 700 hr.

The Alumilite[5] process employs sulphuric acid electrolyte and can be used on all aluminum alloys. The castings are suspended by means of aluminum wire and immersed in a dilute sulphuric acid electrolyte. The castings are connected to the positive pole of the electric circuit and current is passed through at 9 to 22 volts at a current density of 8 to 12 amp. per sq. ft. for 30 min. while the temperature is maintained at 70 ± 2 deg. F. The recommended voltage and current density will vary with the alloy composition. This process also produces an aluminum oxide film on the surface, which film is capable of resisting the attack of a 20 per cent salt spray solution for over 700 hr.

The porous oxide film produced by both of the processes can be sealed by immersion in boiling water or in a 5 per cent potassium dichromate solution for 30 min. This additional treatment increases the film's resistance to corrosion still further.

[5] The Alumilite process is protected by patents owned by the Aluminum Co. of America.

Photographic Metal Is Valuable Production Tool

ANNOUNCEMENT has just been made of a process known as Photo Sensitized Metal, now being manufactured by the Republic Engineering Products, Inc., with offices at 480 Lexington Avenue, New York City.

With this photographic metal, copies can be made by the usual contact printing method; or, with an enlarger, from an ordinary drawing regular print or negative. Aluminum is used as a base. The usual distortion due to unequal expansion and contraction usually present in sensitized film, paper or tracing cloth is completely eliminated. Because of the elimination of any dimensional distortion, this photographic metal can be a valuable tool for speeding up production in those industries working on defense orders as well as of real importance in experimental work.

It is said that no special treatment or expensive equipment is necessary in processing. The manufacturer recommends the usual steps of development and fixation followed in processing ordinary film, using standard developers and fixatives. Because of its slow speed, this metal requires no special darkrooms.

Among the various uses to which it can be applied may be mentioned: exact to-scale copies of drawings, etc., exact copies of photographic plates, instruction sheets and special name plates; it is also ideal for all size templates; confidential drawings can be placed on large thick metal sheets which cannot be removed from the plant without detection; for making permanent records, as it will withstand high temperatures and can be made moisture-proof; will stand rough usage in shop and field without fear of tearing or obliteration of dimensions. It is also possible to modify copies without the necessity of changing the master drawing. Where advisable a picture of the finished product can be placed on the same sheet with the working drawing.

This new photo sensitized metal is being furnished in the following sizes: 5x7, 8½x11, 11x17, and 22x34 in., and in thicknesses of 0.006 to 0.008 and 0.010 in. The company also states that aluminum sheets as large as 5x10 ft. can be coated by this process.

Coolants for Cutting Steel With Carbides

By JAMES R. LONGWELL
Chief Engineer, Carboloy Co., Inc.

COOLANTS should virtually always be used when machining steel with cemented carbides, whereas in cutting cast iron with such tools, coolants are of relatively minor importance and are frequently dispensed with. When used, they serve the purpose, largely, of lubricating the flow of chips, or reducing dust, or cooling the tool somewhat.

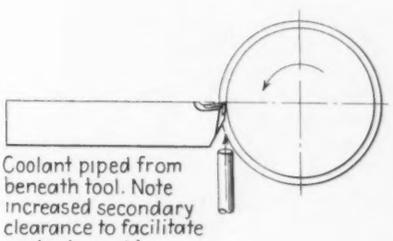
When machining steel, coolants perform two vital functions. They act as a lubricant between the chip and tool, and in addition, quench the chip, tending to stiffen it and making it easier to break. The latter effect is of vastly greater importance with carbide tools than with high speed steel, due to the greater speeds at which the chips leave the work. While steels can be and are occasionally cut with carbide tools without coolants, the life between grinds under such conditions is usually materially less than when coolants are used.

Prime requisite—from a coolant standpoint—in machines to be used for steel cutting with cemented carbide tools, is that they have adequate coolant reservoir, coolant piping and coolant pump capacities. It is frequently overlooked that the vastly higher speeds at which machines can and should be operated when cutting steel with such materials as Carboloy (300-315 ft. per min.) involve the requirement for increased coolant capacity and flow.

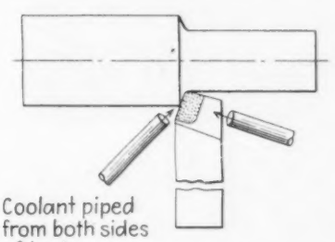
The two prime reasons for this requirement are that a larger amount of coolant will be in continuous circulation, and that the amount of heat to be dissipated by the coolant per minute is greatly increased because of the greater amount of cutting done. Adequate reservoir capacity is necessary so that the coolant itself will remain cool enough to give a temperature differential between tool and work sufficient for the desired effect. Adequate pump and pipe capacity insures the coolant leaving the nozzle under sufficient pressure to force it against the tool and the work.

This introduces another factor in connection with the use of coolants —directing it so as to produce the most efficient cooling and lubrication.

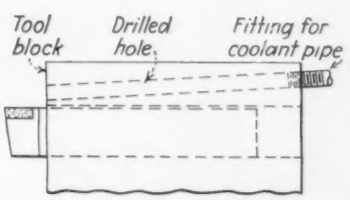
In conventional machine practice, the most common method of applying coolants is to let it flow out of a pipe or nozzle over the work, rolling down over the tool. At low cutting speeds, this method is usually quite satisfactory. As speeds are increased to the ranges desirable for use with cemented carbide tools, however, the coolant when applied in this manner is carried away from the cutting edge of the tool by the fast moving chip. This results not only in decreasing the effectiveness of lubricating qualities, but sometimes even in eliminating it altogether.



Coolant piped from beneath tool. Note increased secondary clearance to facilitate coolant reaching cutting edge



Coolant piped from both sides of tool



Method for providing individual coolant supply to each tool

Another possible source of trouble involved in this method of applying coolants is that the tip of the tool is not properly cooled, so that when it comes out of the work after the cut, the extremely hot cutting edge is suddenly chilled by the coolant.

The most effective method of applying coolants when cutting steel with carbides is through pipes—approximately $\frac{3}{8}$ in. in diameter. The illustrations show three ways of piping coolant to the tools. In each case the coolant should be forced against the work at the tool tip with some pressure for best chip control and cooling action.

As to types of coolants to be used, the prime requisite of course is that they have good cooling qualities. A good soluble oil works well. Here the water is used for the cooling action, while the oil emulsified with it provides the necessary lubricating qualities and rust prevention. Cutting oils are used in some cases, but have been found objectionable at times from the standpoint of the smoke developed. Furthermore, straight cutting oils are not usually good coolants at speeds of 200 ft. per min. or greater.

Simplified Shell Lathes

NOW that they are actually in production, there is disclosed for the first time the design details of a line of special machines for the making of shells, developed through the Defense Committee of the National Machine Tool Builders' Association. The engineering work was under the supervision of Myron S. Curtis, consulting engineer. The purpose of the project, undertaken at the suggestion of Army Ordnance officers, was to put into the hands of the War Department tested designs for shell machines that could be built quickly in any well-equipped machine shop whenever the need arose.

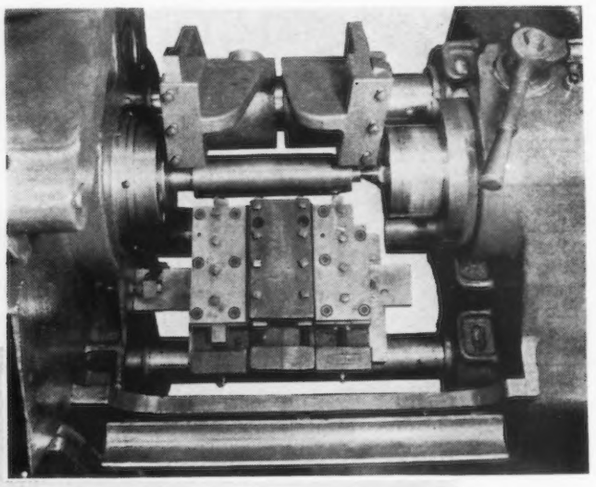
By making it possible for plants not otherwise engaged in the defense program to build shell machines, the machine tool industry has broadened the source of supply and at the same time has freed itself to a greater extent to concentrate on the production of equipment for aircraft engines, tanks, guns and other items that require precision machine tools. Though shell manufacture is important, it is not a precision job. The closest limit on a shell is 0.005 in. and most limits are from 0.020 to 0.030 in.

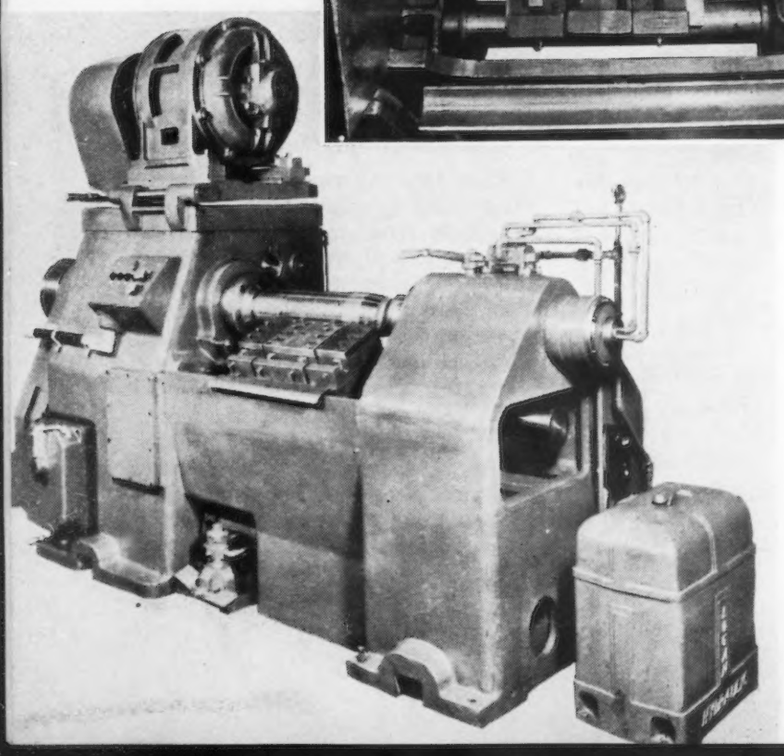
The design comprises a complete line of machines for turning, boring and facing medium-caliber shell. The machines are of two sizes—one for the 3-in. group of shell, the other for the 6-in. group. In each group there is a basic machine that is standard for all of the operations in that group. Each unit is then equipped with whatever slides, tailstock, tooling equipment and motor drive are required for a certain operation. The machines are capable of all operations except cross drilling, notching, nosing-in, squeezing the band into its seat, and welding the base endplate.

There are three outstanding features about the new machines: (1) They are of simple construction so they can be built quickly in substantial quantities; (2) they are inexpensive and can produce shells economically, and (3) they are automatic so they can be handled by unskilled operators.

To make the building of the machines as simple as possible, on the main casting the design completely eliminates all large planing and boring operations and in fact all machining operations, except for the drilling of a few small holes. This is accomplished by supporting the carriage for the turning tools as well as the swinging arms for facing operations entirely on three longitudinal bars instead of planed way surfaces. Moreover, these bars, together with the spindle, tailstock sleeve and all shafts, are carried by bushings cast in place in the main base of the machine.

The casting-in-place of bushings is accomplished by use of a pouring fixture for locating and supporting the bushings on pilot bars, and the use of a low melting point





ABOVE

• • Tooling set-up for simultaneously rough turning the diameter and facing the end of a 75-mm. shell on the N.M.T.B.A. shell lathe. Tailstock is hydraulically actuated, but the tool movements are accomplished through cams.

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• • By using bars for ways and holding the bushings in the heavy bed casting with a low melting point alloy, practically all machining operations are eliminated on the bed of this "Association" automatic shell turning lathe. Even the cover is bolted to the headstock through a soft metal gasket poured in place.

—N.M.T.B.A. Announces New Designs to Speed Production

lock-in metal. The base of the machine has pouring holes cast in it, and in some designs two bushings are poured through the same hole. The recommended pouring metal is a lead-tin, high-bismuth alloy which expands slightly upon cooling.

In addition to the bushings supporting all shafts, the seat upon which the cover plate and motor support rests is also made of this soft metal alloy, which is poured in a trough on the top of the headstock of the machine and allowed to find its own level. All doors and plates are attached to the rough base casting by cap screws and neoprene gaskets are used to insure oil-tight joints, as the door seats are not machined.

The machines have a single spindle speed except in cases where two-speed motors are used. The motors vary from 10 to 60 hp., depending upon the operation to be performed.

The drive from the main motor is through V-belts to a driveshaft, then through a jackshaft to the spindle. The drive to the feed mechanism is through a chain and sprockets to a set of pick-off gears, then through a shaft to a feed worm and gear. This gear drives a drum cam for reciprocating a sliding bar on which the turning carriage is located, as well as face cams for operating the facing arm and the bar for supporting and oscillating the turning carriage. Certain of the tool blocks are slideable in the tool carriage and are controlled by a stationary cam bar. Rapid traverse of the tool carriage is effected by a separate motor belted to the feed box.

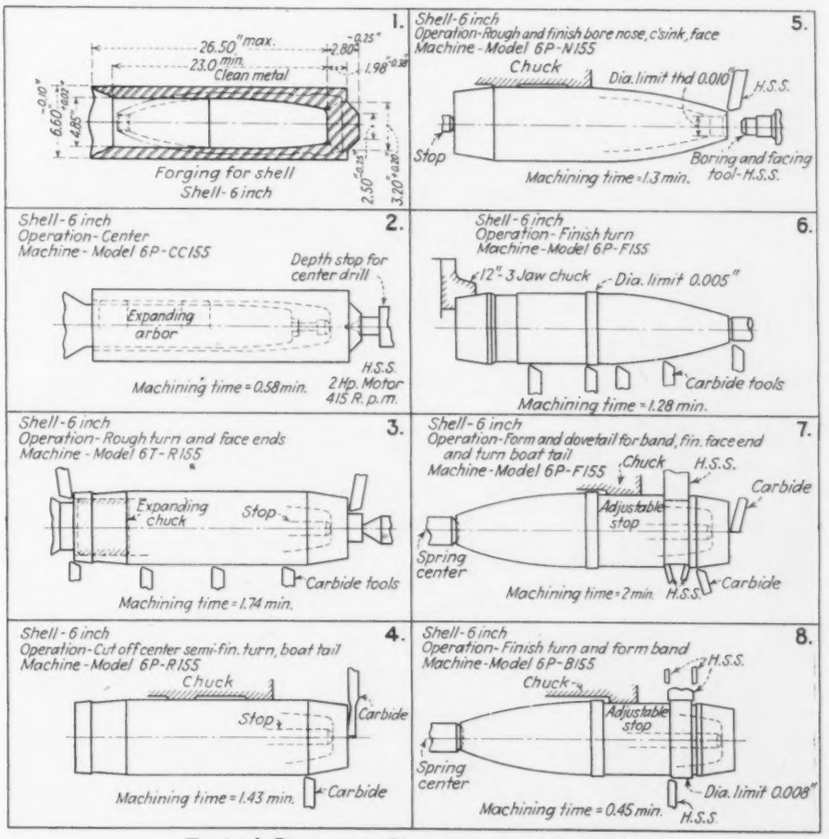
All shafts run in plain bearings, but there is a ball thrust bearing on the spindle as well as on the feed drum shaft. These sleeve bearings are bronze, with a lining of babbitt metal about 0.030 in. thick.

The machine has a live tailstock center which is moved longitudinally by hydraulic pressure. The valve for controlling this hydraulic movement is operated by the binder lever so that only one movement of the lever is necessary to position the center and clamp it.

There are two principal methods of holding the shell: Gripping it on the inside of the open end by means of an expanding arbor, while using the tailstock center for supporting the base end of the shell; and gripping it on the outside diameter by means of a collet chuck. In either case the shell holding mechanism is hydraulically actuated, and control is by means of foot levers, leaving the operator's hands free. It is intended that one central hydraulic system, with accumulator and tank, will serve a complete line of the machines, to avoid the greater expense of a self-contained hydraulic system for each machine, although the latter is illustrated.

Lubrication of the machine is by gravity from a trough cast in the top of the base and from which oil pipes lead to the various bearing surfaces. Oil settles in a sump from which it is pumped by a separate motor through a strainer and pressure valve back to the trough. A pressure switch assures that none of the operating motors, with the exception of the lubricating pump motor, can be started unless there is sufficient pressure on the lubricating system.

It is intended that coolant be supplied a line of machines by gravity from a central tank. The central system would serve two purposes—reduce costs and keep the coolant at a much lower temperature than would be possible otherwise without requiring tremendous quantities of coolant.



Typical Operation Sequence for 6-in. Shell

50th Anniversary of Man u

By FRANCIS D. BOWMAN
Carborundum Co.

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IT is just 50 years since Edward G. Acheson discovered silicon carbide—the first man-made abrasive to be produced on a commercial scale.

Emery, whose principal abrasive constituent is corundum—aluminum oxide—has been used for nearly 2000 years. But, not until 1825 is there a record of artificial wheels—when a Hindu tribe bonded natural corundum into wheels, using gum resin as the bond. It is only about 100 years ago that artificial wheels, using natural abrasives, became at all common.

While emery wheels were much faster cutting than sandstone wheels they were far from being satisfactory production tools for the removal of material. They were not uniform enough, nor hard enough. Their use was confined to sharpening and to polishing surfaces which had been machined with cutting tools.

In 1891 Acheson was following up some previous experiments in which he had noticed that clay articles which were fired in natural gas furnaces became impregnated with carbon and were harder than those which did not contain carbon.

It has been said that he was trying to make artificial diamonds. There is nothing to prove this. In fact it is doubtful if he was even trying to make an abrasive. His experiment was made with a crude electric furnace fashioned from a plumber's solder pot, which he filled with a mixture of powdered coke and clay, through which he passed a heavy current.

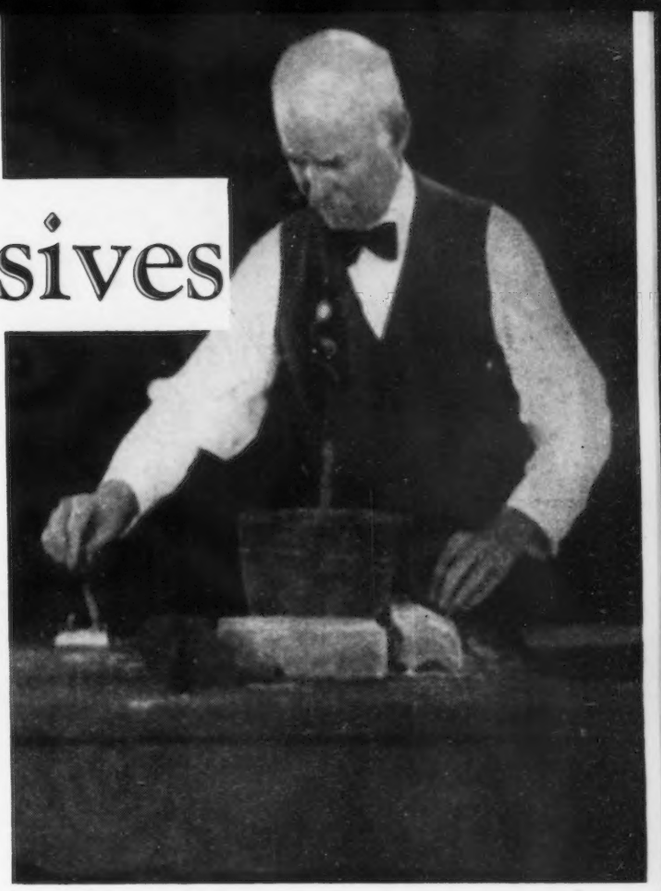
When the mass was cooled, Acheson was disappointed with the result, but as he says, by "sheer chance," he happened to notice some bright specks on the end of the carbon electrode. He found that these specks would scratch glass. They were silicon carbide, and further tests showed them to be harder than any natural abrasive other than the diamond. But for some time he did not know the chemical analysis and, thinking they might be crystals of a composition containing carbon and corundum, he called the substance Carborundum.

In spite of the demonstrated abrasive qualities of the new substance Acheson could not get the established manufacturers of emery wheels to use silicon carbide. They claimed it was not possible to make it up into successful wheels. So he began experimenting in wheel manufacture. These experiments were successful, and he went earnestly to work to make high grade vitrified wheels. One of his first orders was for 60,000 small wheels for use in grinding the joint in the early Westinghouse incandescent lamp. Acheson says that he made those wheels with his own hands.

The success of wheels made with silicon carbide stimulated research into the possibility of making other abrasive materials. In 1899, Charles B. Jacobs invented a process for making c o r u n d u m — crystalline alumina—in the electric furnace by

• • Dr. Acheson's second furnace built of brick in which the power was carried to his mixture through electrodes set in the side of the furnace.

ufactured Abrasives



• • Dr. Acheson re-enacting his experiment of 50 years ago through which he created the first crystals of silicon carbide, trade named Carborundum. Note the replica of Acheson's first furnace, which was simply an iron bucket such as plumbers use for the melting of solder.

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fusing bauxite, which is the purest form of aluminum oxide found in nature in commercial quantities.

But, the displacement of natural abrasives by the manufactured ones was comparatively slow. A book published in 1903, "Emery Grinding Machinery," has only one reference to manufactured abrasives. It says, ". . . (An) artificial product known as 'Carborundum' has during recent years been used for making wheels; these have in some cases, where the work has been of a special kind and the wheel has been run at a suitable speed, given results far better than those usually obtained by either emery or corundum."

Today, of course, emery wheels are rarely found in metal working plants. Except for diamond wheels used largely in sharpening tools made of the cemented carbides, practically all grinding wheels employ as the abrasive one of the two manufactured substances — silicon carbide or aluminum oxide.

Basically the qualities of the two are quite different. Silicon carbide is the harder and more brittle. Since the crystals break more easily new, sharp cutting edges are constantly presented to the work. This makes silicon carbide especially suited to grinding hard materials and those of low tensile strength.

Aluminum oxide is tougher and does not fracture so readily. It is therefore suited to grinding tough materials of high tensile strength.

The qualities of both abrasives can be altered considerably in the making and by subsequent treatment, so that it is possible to get a manufactured abrasive practically ideally suited to any grinding, polishing, honing, or lapping job.

In addition, wheels are made in five different bonds and in a wide range of bond "grade" or hardness. This increases the adaptability of the wheel to the job. So uniform are modern abrasive wheels that once the right wheel has been found for any job, the user can be sure that all future wheels of the same specification will perform in exactly the same way.

Manufactured abrasives in the form of wheels, loose grains, sticks and coated papers and cloths have made mass production possible. For some operations various metal cutting machine tools will give close enough accuracy. However where the tolerances are very close and an especially smooth surface is essential, grinding, sometimes followed by lapping or honing, is the only way to achieve perfect interchangeability.

The automobile is often given as an example of mass production. There are, however, hundreds of other products of steel mills and machine shops which owe their expanded markets to the low cost and accuracy with which they are produced by mass methods. There are hundreds of devices that are now so inexpensive that they are in use by thousands or millions of people who 50 years ago could not have afforded them. Many of those devices could not have been produced at all by the methods then in use.

In spite of the greater precision and smoothness of ground surfaces, they are often the cheapest to produce. A few examples:

Slotting a locomotive part took 30 min. It is ground in 3 min. A motor base is ground in one-third the time required for milling the surface. A steam fitting is ground in 10 min. as against 40 min. by the former machining method.

A slide for a machine tool was formerly planed and then hand-scraped in a total time of 12 to 14 hr. It is now ground to such surface perfection in 1½ hr. that the scraping operation is unnecessary. A part for another machine tool is ground to such accuracy and high finish that no scraping is needed. The time required for grinding is 6 hr. Formerly 40 hr. of hand scraping was required.

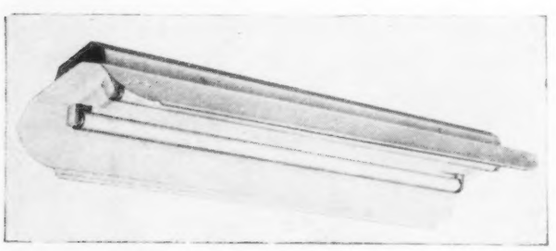
Examples to show the accuracy, high finish, wearing qualities and economy of articles into which grinding wheels and the other forms of modern abrasives enter could be cited by the thousand. It is a fact that it is practically impossible to mention a single product which is not better or cheaper, or both, because of Acheson's discovery in 1891.

New Equipment . . .

Industrial Lighting

Here are described the latest developments in the rapidly advancing field of lighting technique: fluorescent and incandescent, special purpose lamps and auxiliary equipment.

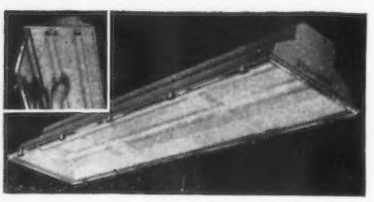
THREE new fluorescent industrial lamps have been brought out by *Westinghouse Electric & Mfg. Co.*, East Pittsburgh, Pa. Models FPR and FPC, both open end types, are designed for general and supplementary lighting of low bay industrial areas and are equipped with two 40 watt, 48 in. tubes, either white or daylight. Model 2-FPR luminaire with closed ends is designed for heavier duty and high level illumination of industrial plants, using two 100-watt 60 in. tubular bulbs. All these lamps take 60 cycle a.c. and cover the more commonly occurring voltages. They are equipped with steel



sheet hoods, enamelled reflectors with a cut-off of 72½ deg., self-contained starting device and a twin ballast equipment which together with the starting compensator provides a power factor of 95 to 99 per cent. Mountings can be arranged to suit, but FPC can be supplied fitted for continuous strip lighting, while 2 FPR can be had also in the diffusion type allowing a minimum of 2½ per cent of the light to pass upwards through apertures, reducing brightness contrast between the lighted areas and the ceiling.

Enclosed Fluorescent Lamps

SEALED Flo fluorescent lamp housings are produced by the *Benjamin Electric Mfg. Co.*, Des



Plaines, Ill. These units are fully enclosed, making for easy cleaning and extending the use of fluorescent illumination to locations needing vapor and dust proof equipment. The possibility of fitting in the cover a variety of glass makes possible special lighting for drafting rooms, offices, studios, etc. The cover is hinged to the lamp housing and locked into place by hand operated cover clamps. These units are available in arrangements for either two or three 48 or 60-in. fluorescent lamps. The light absorption of the specially clear glass cover affects only very slightly the rated 78 per cent light output efficiency.

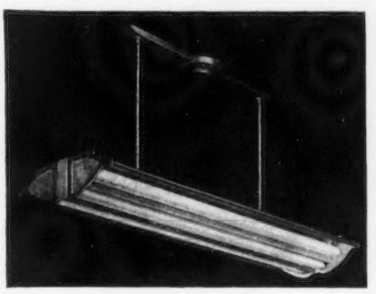
Lamp Shielding Louvers

WHILE the shielding angle of the reflector skirt of fluorescent lamp fixtures is satisfactory for most industrial plant applications, in some cases greater eye comfort

is desirable, as, for instance, in drafting rooms, laboratories, etc. Therefore the *Benjamin Electric Mfg. Co.* has produced new louvers which can be attached to their Stream-Liters and increase the shielding angle to about 23 deg. in all directions. In a room lighted with louver-equipped lamps, glare is completely eliminated and the fluorescent tubes can only be seen from immediately below. Two spring clamps secure the louvers in position.

Direct-Indirect Fluorescent Lighting

DESIGNED to deliver through new reflectors 85 per cent down-light with wide distribution and 15 per cent up-light to the ceiling, the new luminaire Tru-Co-Lite is produced by the *Edwin F.*



Guth Co., 2615 Washington Boulevard, St. Louis. It is built with reinforcing cast aluminum ends and available for four 40 or 20-watt tubes. It is supplied wired, complete with 95-100 per cent power factor accessories and separate starter switches. This company also produces plastic diffusers in a variety of colors. These shatterproof diffusers are simply clamped on to fluorescent tubes in order to reduce glare.

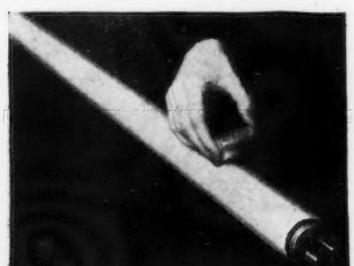
New Bench Lighting

FLUORESCENT lamps mounted on a wide variety of flexible arms, providing complete adjustability are supplied by the *Fostoria Pressed Steel Corp.*, Fostoria, Ohio. An assortment of bases and clamps

permits attachment of the fixture to almost any piece of equipment, such as a drafting table. These bench models are portable and use one tube of either 15 or 20 watt rating.

New Fluorescent Lamps

WITH the demand for fluorescent lighting spreading to a variety of fields, General Electric's lamp department at Nela Park, Cleveland, has just brought out four new fluorescent Mazda series: a 100-watt, 60-in.; a 6-watt, 9-in.; a 14-watt, 15-in. daylight, and a

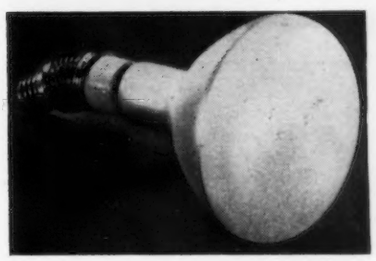


soft-white F lamp. All are equipped with bi-pin bases. The 100-watt lamp employs a tubular bulb for general lighting in white and daylight. It produces more than double the amount given off by the standard G.E. 40-watt lamp with only a slight increase in surface brightness. Smallest of all F lamps is the new 6-watt 9-in. lamp which comes in both daylight and white. The new Mazda soft-white F tubes are produced in a variety of wattage and length. The 14-watt, 15-in. F lamp gives out a daylight quality of illumination.

A 100-watt lamp, 60 in. in length and 2½ in. diameter is simultaneously announced by the *Westinghouse Lamp Division*, Bloomfield, N. J., under the name of Mazda F and by the *Hygrade Sylvania Corp.*, Salem, Mass., under the name of Hygrade 100 watt. It is stated that this lamp has a life of 2000 hr. and an initial output of 4400 lumens in 3500 deg. white color.

All Purpose Floodlight

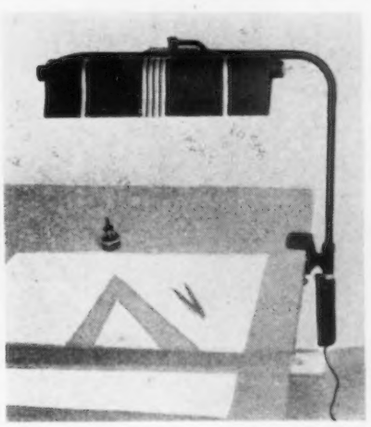
GENERAL purpose Birdseye Floodlite delivers a concentrated beam of medium width that is especially effective in applications requiring intense illumination for exacting work. The floodlight is essentially an incandescent filament bulb with a lining of pure silver sealed inside to form a reflecting surface that cannot be dulled or tarnished by dust or fumes. For localized lighting to supplement general illumination, a detachable



swivel socket focuses the light exactly where needed. The floodlight is made by the *Wabash Appliance Corp.*, 33 Carroll Street, Brooklyn, in four sizes and four voltages, from 100 to 300 watts and 110 to 125 volts.

Light for Drafting Tables

SYNTHETIC north daylight is produced on the drafting desk by the new *Engineers Fluorescent Lite*, according to the makers, the *Frederick Post Co.*, Box 803, Chicago. The special pigment treated reflector balances the heavy blue light which is radiated by most fluorescent tubes and produces a neutral colorless light. Thus, it is claimed, the cheaper and cooler fluorescent lighting is made accessible to the drafting office in an



attractive form. The swivel arm can be adjusted to any position from the table top to 24 in. distance and the shade can be swiveled in a horizontal arc of 360 deg. and a vertical arc of 180.

Snap-On Fluorescent Channels

QUALITY channels which may be had in either one-light or two-light V models are produced by *Wilson Lighting, Inc.*, 411-413 South Clinton Street, Chicago. They are finished in scratch-brushed, zinc-coated steel and supplied with the flush "mitered" snap-on covers and screw driver snap release, facilitating assembly and removal. Units may be had in 4 to 12 ft. sections and take standard sockets, starters and ballast for 12 to 48 in. fluorescent lamps. These channels are suitable for a variety of mountings.

Vibration and Corrosion-proof Lighting Unit

FOR local floodlighting, *Westinghouse Electric & Mfg. Co.*, East Pittsburgh, Pa., has developed the Tufflite concentrator, a lighting unit using either a 300 or 500-watt

PS-40 Mazda lamp, capable of withstanding vibrations and resisting corrosive atmospheric vapors. The complete unit consists of a copper housing, inner Alzak aluminum reflector, cast bronze socket housing assembly, swivel for ¾ in. conduit mounting, and a glass cover door assembly. All hardware is bronze or copper and nickel plated. The heat resisting glass spread lens is held securely in place against a graphitized asbestos gasket by eight bronze spring clips fastened with machine screws.

Lamp Starter

A NEW and improved fluorescent lamp starter, Mirastat, is announced by the *Hygrade Sylvania Corp.* There are three types for use with 15 and 20, 30 and 40, and with 100 watt lamps. Due to proper preheating of lamp cath-

odes, sputtering is claimed to be eliminated, blackening of lamp ends retarded, life lengthened and starting and restarting made more precise and accurate.

Floodlight

WESTINGHOUSE ELECTRIC & MFG. CO., Lighting Division, Edgewater Park, Cleveland, has announced the addition of two new lightweight, weatherproof and universal floodlights to their A-8

and A-10 lines of lamps with respectively 8 and 10 in. diameter lens and 100 and 200 watt bulbs. These floodlights have found a wide application in every field and are equipped with etched aluminum reflecting surfaces. A one-piece reflector is employed, to which is attached an extruded aluminum socket housing. The assembly can be turned 360 deg. horizontally and vertically through 135 deg. Flat base or ground spike base are optional, and plain or spread beam light distribution through plain or colored lenses.

Improved Fluorescent Lighting

HYGRADE SYLVANIA CORP., Salem, Mass., is extending further its line of fluorescent industrial lighting equipment with the Model F230 which incorporates the new 100-watt 60-in. tubes, and which is, therefore, suitable for high suspension in plants and offices. It is completely corrected for stroboscopic effect and comes equipped with lamp, starter and Dua-Lamp auxiliaries. The starter is improved, reflector enameled and total wattage with auxiliaries is 230. The lamp is operated on 110-125 volts, 60 cycle a.c. The older HF-100 model has been improved by a reflector shaped more efficiently for giving maximum light toward the working surface. It operates on the smaller 48 in. tubes using a total of 100 watts with auxiliaries. For both models leads and suspension equipment are supplied to meet users' requirements.

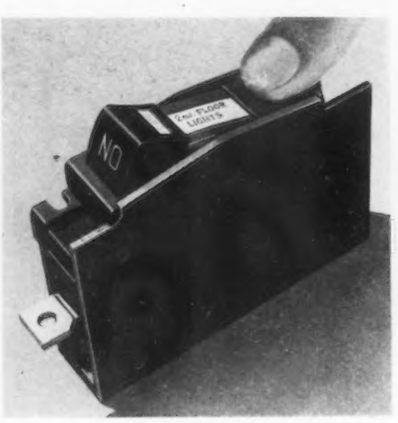
Medium Spread Floodlight

IN the most rigorous tests the new aluminum Alzolite with 90 deg. spread of beam is said to have proved its complete weather and dust resistance, being designed to afford absolute protection to lamp and reflecting surfaces against rain, moisture, dust, fumes or smoke. The covers of this lamp, which is produced by the *Benjamin Electric Mfg. Co.*, are hinged at the top and secured by a series of hand-

clamps around the rim. A vertical stop is incorporated in the cross arm mounting bracket to permit easy resetting.

Lighting Circuit Breaker

ROCKER shape switches with exceptional features are introduced by the *Bull Dog Electric Products Co.*, 7610 Jos. Campau Avenue, Detroit. These lighting switches will always give clear indication of the condition of the circuit; "on" and "off" are clearly marked, and overload or short circuit will cause the automatic breaking of the current and a clear indication by the protrusion of small red marking rod, which can be seen and felt easily. Provided with ample labeling space, these switches are most useful on switch boards.

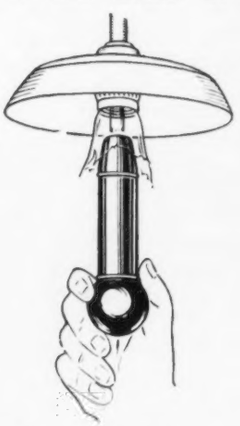


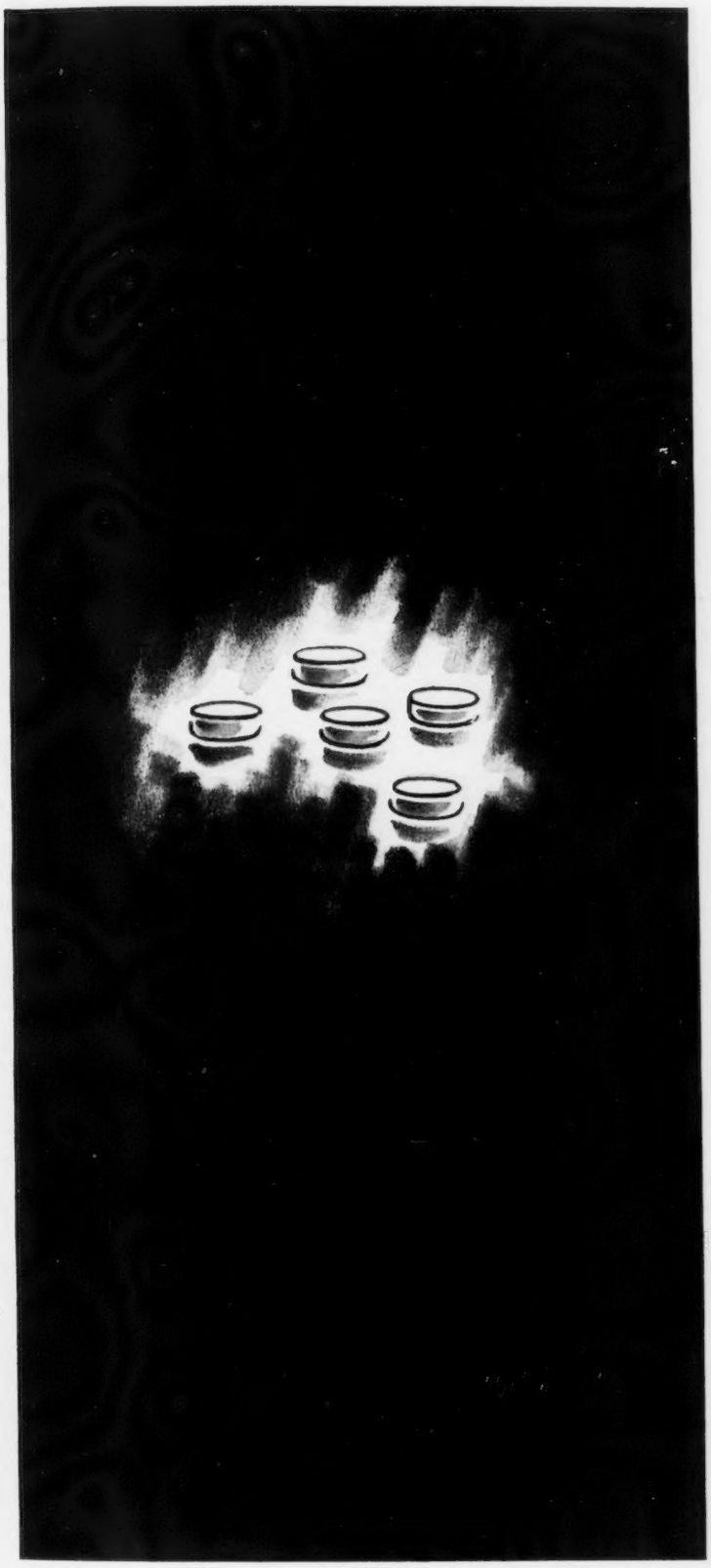
Explosion-proof Lamp

EXTENSION lamp of 100 watt capacity with Underwriters' listing for use wherever explosive vapors may render dangerous the use of ordinary lighting equipment, is announced by the *Stewart R. Brown Mfg. Co., Inc.*, 258 Broadway, New York. With a safety grip of molded plastics, a spark proof hook and guard and an automatic circuit breaker which shuts off the current when the bulb breaks, this lamp is claimed to be considerably brighter than any portable model of equal weight previously listed by Underwriters. The one-piece guard must be in place before the lamp will light.

Lamp Remover

THE C & E lamp base remover is designed to unscrew the stubs of broken bulbs safely, avoiding shorts and shocks. It is inserted in the broken base and this can then be removed easily, even while the current is on. It is made in two sizes for medium and mogul screw bases by the *Ericson Mfg. Co.*, 5716 Euclid Avenue, Cleveland.





Metals need vitamins, too!

● Much as vitamins fortify the body with greater vitality and resistance, minute and controlled amounts of substances added to metals and alloys greatly increase their efficiency, usefulness and life.

The research laboratories of Revere Copper and Brass Incorporated have made an intensive study of this metal "vitalizing" process. It has resulted in many improved applications of copper and its alloys. Three of these applications are especially notable.

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2. A sheet copper with a high resistance to "season cracking."

3. Brasses, bronzes and other alloys with finer "working" and "machining" qualities.

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On The Assembly Line

BY W. F. SHERMAN
Detroit Editor

• Trend toward higher horsepower in airplane engines may cause some production difficulties, but none of serious character is anticipated . . . Changes also in prospect to permit fighting ceilings of 50,000 feet . . . Automobile output remains at high level.

DETROIT—Following unsubstantiated rumors that both German and British airplane production had dipped to temporary low points, indicating changeover to higher powered models, there comes authoritative information indicating that horsepower output of warplane engines will be doubled in the craft that will play the most prominent roles in the forthcoming spring campaign. Planes of 2000 hp. each will be the minimum acceptable in the highly competitive business of carrying bomb loads and policing the skies in fighters.

How all of this will affect American tooling programs is problematical, but investigation leads to the conclusion that American industry is prepared to supply as much horsepower in a single package as the military pilots demand. Moreover, consideration of the designs offers basis for belief that a doubling of horsepower is no insurmountable obstacle for designers or for production departments. In their essentials, the higher output engines seem to be merely multiples of the present designs, so tooling, for the most part, will continue to be usable.

European Engines Discussed

Specific information on the European engines comes from no less an authority than A. T. Colwell, national president of the Society of Automotive Engineers, and head of Thompson Products Co., Cleveland, an important aeronautical supplier for many years. Colwell spoke in Detroit before a closed meeting of the SAE, but has given permission for use of some of his data.

He listed three important new British engines in the high-output classification. The Rolls Royce Griffin is a 12-cylinder V-type developing 1600 hp. The Rolls Royce Vulture has 24 cylinders (four banks of six cylinders each) and delivers 2000 hp. Essentially this is two of the Merlin engines mounted on a common crankcase. The third is the Napier Sabre, a liquid-cooled 24-cylinder engine developing 2000 hp. Its cross-section resembles an "H". The leading new German motor is a Double Daimler Benz 600 A which develops 2000 hp.

The planes in which these are installed must be formidable craft. Two thousand horsepower appears to be the minimum for the fighters and 4000 hp. minimum for light bombers. The Hawker Tornado fighter, for instance, employs the Vulture engine and has the terrific firing power of eight machine guns and three 20 mm. cannon. The Westland Whirlwind fighter has only two Merlins, but is capable of 400 m.p.h. and has the added feature of a power turret, unusual for a fighter plane. The two most recent bombers he listed as the Short Stirling, which uses four Hercules engines totaling 5600 hp. and has a supercharged cabin for high altitude performance, and the Vickers Wellington and Whitley bombers which use two engines each, either the Vulture or Sabre.

Among the German planes, he said, will be the Focke-Wulf, which has a Double DB engine and is capable of 400 m.p.h. plus, the Henckel 119 bomber with two Double DBs and the Messerschmidt fighter, with two Double DB engines. Since the Double DBs are rated at 2000 hp., this would indicate that the new Messerschmidt is a fighter carrying 4000 hp.

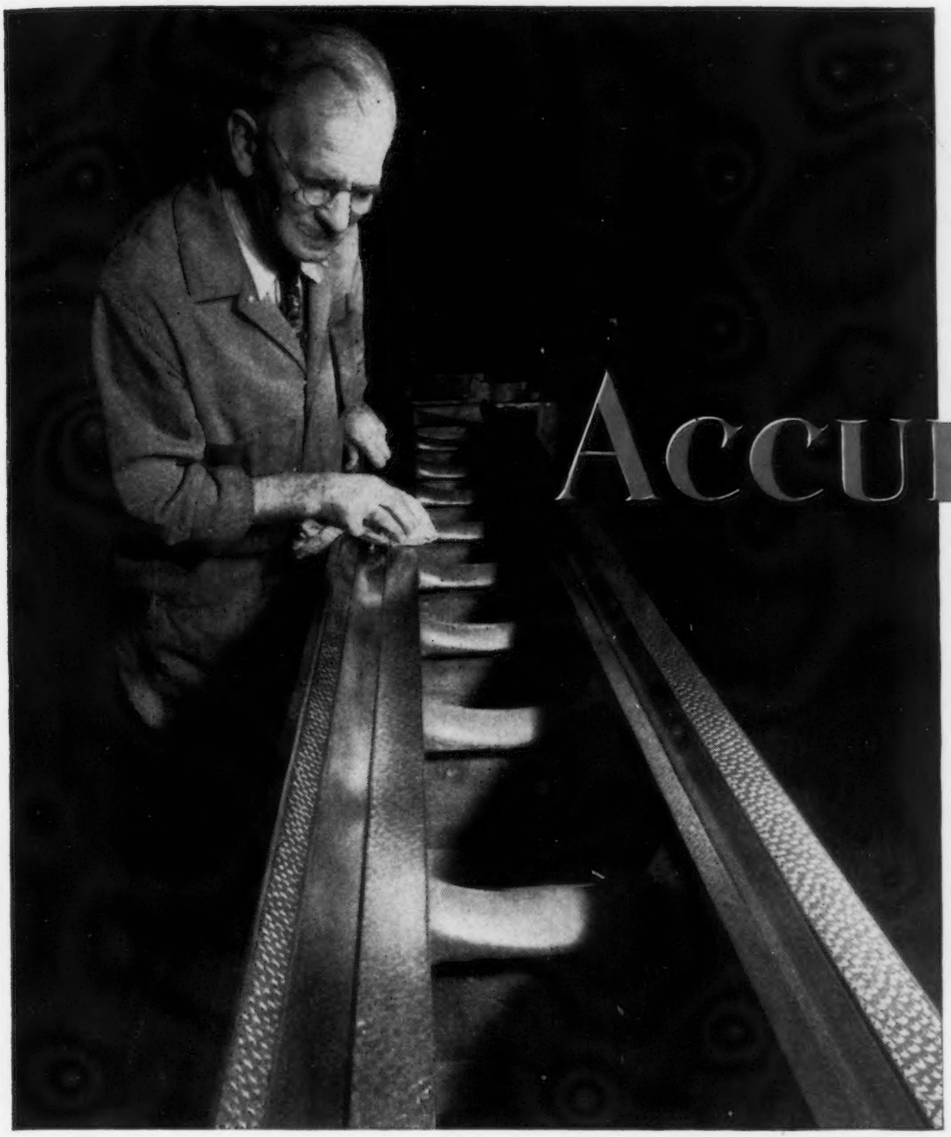
Colwell covered the American situation by saying that we now have 2000 hp. available, soon will be able to offer 3000—not stating whether this meant liquid-cooled or air-cooled engines.

It is common knowledge that some of the air-cooled powerplants going into the flying fortresses will develop something in the neighborhood of 2000-2200 hp. each. One aviation authority has mentioned 2400 hp. available from a newly developed liquid-cooled engine. Allison has had in development stages a 2000 hp. engine which is a 24-cylinder X-type, consisting essentially of two of the 1000 hp. V-type engines mounted together. In fact, this engine was on public exhibit at the World's Fair in New York. Chrysler is known to have developed a new in-line liquid-cooled airplane motor in the higher power brackets. Unofficially this has been stated to be a 2000 hp. engine, although if it turns out to be only 1000 hp. it may serve as the basis for a V-type engine of much higher output, since output per cylinder is one of the controlling factors in determining final horsepower rating.

High-Output Engines Developed

Still another available high-output engine is the Ford experimental model which is said to be a 12-cylinder V-type liquid-cooled engine expected to develop 1500 to 1700 hp. Multiples of this would offer in excess of 3000 hp. Another engine being developed by an automotive concern has been carried up to 32 cylinders in its experimental form. It is in approximately the same power range as the announced Ford figures, although it is air-cooled and virtually diamond-shape in cross-section. (This consists of two V-type engines mounted head-to-head with crankshafts at the top and bottom.)

None of these developments is likely to upset com-



Individual craftsmanship remains a key element in the manufacture of P&W lathes; *no* machine can produce this accuracy. This lathe by now is doing its turn for defense.

ACCURACY

Photograph by Kessel

mass-producer of specialists

AMERICAN engineers and toolmakers are using the supreme accuracy of Pratt & Whitney machine tools to create specialist workmen on a mass production basis. Faced with a shortage of highly skilled workers in this time of crisis, American industry is solving its problem by training men to handle *particular* operations on *particular* machines—depending on the accuracy of those machines for efficient, high quality production. And the system works! Those machines and jigs and fixtures *are* accurate because they were made by other precision machines—toolroom machines—the product of Pratt & Whitney craftsmanship. Accurate mass production branches out from the stem of P&W *basic accuracy.*

Accuracy always *begins* with human beings. Over 3200 Pratt & Whitney skilled craftsmen nurse basic accuracy into the P&W products that are rolling out of West Hartford 24 hours a day.

PRATT & WHITNEY

Division **Niles-Bement-Pond Company • West Hartford, Connecticut, U. S. A.**

pletely the production planning or the actual production that is going on today. A General Motors spokesman sums up the Allison situation by saying: "The 2000 hp. is available; so far the Army and the British have purchased the 1000 hp. type and suggest no change." Similarly, the Rolls Royce program at Packard is being carried out on schedule and changes are being discouraged by the British in the interest of maintaining the schedule. There is substantial evidence that the British themselves anticipated the eventual use of a 2000 hp. engine and they do not regard the Merlin 20 (at Packard) as an obsolete type. In fact, tests on that engine were completed by the British only last April. A general use of twin-engine fighters makes available 2000 hp., even though in two powerplants, as in the Westland Whirlwind mentioned above. Similarly, the Lockheed twin-engine pursuit engine in this country carries a total of 2000 hp. or more.

There can be no gainsaying the fact that if manufacturers are forced to switch from V-type engines to X-type or some other multiple of the basic engine, there will be plenty of production troubles. But in almost every instance of this sort the basic cylinders are maintained untouched, so thousands of parts can be manufactured with the same equipment and the same methods. Crankcases and crankshafts are among the major units which change when the design is changed, but cylinders, pistons, rods and valve assemblies are important units on which production can continue uninterrupted.

Higher Fighting Ceilings

Changes in planes and engines and special equipment for pilots to permit fighting ceilings of 50,000 ft. are urgently needed and are on the way, according to Colwell. Problems of vapor lock, which increase greatly with altitude, have been met already by installation of an electric centrifugal auxiliary booster pump at the fuel tank. Such boosters, developed in this country, have been installed on every motor on all the bombers flying the ocean to England. The inlet of the pump is so designed that vapor or gas is expelled from the impeller while solid liquid passes through. A recent test on a bomber showed a ceiling of 23,000 ft. without the pump and 36,000 ft. with the pump in action.

The two-stage supercharger and the turbo-supercharger are used now on virtually every plan engine to restore power and even increase plane speed in the sub-stratosphere. However, Colwell predicted that three-stage superchargers will soon be a necessity for that a combination of turbo-supercharger and mechanical supercharger may be used in two stages to boost the altitude above the 30,000 ft. practical maximum that is now in effect. Planes with the highest ceiling have a tremendous advantage in military operations, of course.

Supercharged cabins or supercharged flight suits to be worn by pilots are already widely publicized. Physiological effects above 18,000 ft. are severe. The effects on the pilot are attributable, first of all, to lack of oxygen (which must be fed to the pilot through a face mask) and, second, to the escape of nitrogen from the tissues and bloodstream, a phenomenon called aeroembolism. At present, even with oxygen fed to the pilot, 35,000 ft. is about the limit of human endurance because the internal body pressure and external barometric pressure are so unbalanced that the human system will not properly function. These problems, medical in nature, are being solved principally by the aeronautical and mechanical engineer. They involve manufacturing problems which must be taken care of as soon as the engineers come up with the right answer.

Fuel Tanks Well Protected

Already answered by the engineers and manufacturers is the problem of supplying self-sealing fuel tanks. A photograph of a cross-section of one of the German fuel tanks shot down in England shows that inner tanks are made of fiber, surrounded with $\frac{1}{8}$ in. of buckskin, then $\frac{1}{8}$ in of natural rubber. The rubber expands when in contact with gasoline and closes holes made by bullets. The American counterpart has five layers and is effective against both 30 and 50 caliber bullets, as many as 27 50 caliber bullets having been fired through a 20-in. square panel without leakage. As made by Firestone they have steer hide on the outside because tears are restricted without ripping. The steer hide gives strength and rigidity. Underneath this is a layer of LA-100, a special sealing material which is permanent in its sealing effects but somewhat slow to act. Under this is a layer of sponge rubber, followed by another layer of LA-100. The sponge rubber acts quickly but is not permanent, so the two materials supplement each other. The sponge rubber has non-communicating cells to prevent wick action. The inner lining of the tank is Neoprene, used to keep the gasoline from the sealing materials. However, since gas is soluble in Neoprene, the interior is coated with gasoline-resistance resin.

Incidentally, it is noteworthy that American engineers concentrated for years on the production of a crash-proof tank as a safety factor to prevent fires in passenger planes in the event of accident. Meanwhile, the Nazis, intent on their professional planning for war, developed the bullet-seal tank. Engineers claim now, however, the American product far excels the German fuel tank in resistance to gunfire.

Secondary effects of strikes in the automotive supplying industry have eased production totals somewhat, although they are still at unseasonable high levels. Output in the past week was 126,550 cars and trucks, compared with 127,740 in the previous week and 100,855 a year ago, according to Ward's Reports, Inc.

Trailers Being Used By Defense Workers

Chicago

• • • **Trailer manufacturers here report that most of their products are being used as housing for workmen engaged on defense construction projects throughout the country. One manufacturer said, that a nice trailer suitable for a family of four can be obtained for $600. Many of their owners not only house their families but rent any extra space to other workmen since housing is at such a premium on the construction projects.**

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PERFORMANCE
is vitally
important
YOU FIND
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STAINLESS

There must be a mighty good reason why Carpenter Stainless is entrusted with those jobs where unfailing performance is demanded.

Take, for example, the delicate mechanism housed in the glass tube which controls the modern magic of radio broadcasting. Through its fine adjustment and perfect functioning, it holds the frequency of the broadcast right on the nose.

To get this kind of performance—the maker of these thermostatic control tubes chose Carpenter Stainless Steel for the precision parts shown.

Although a job like this requires only a minute quantity of the thousands of tons of Carpenter Stainless consumed by industry, it illustrates the quality and uniformity so characteristic of every pound of this Stainless Steel.

Whether your work calls for the making of small precision parts or giant turbine blades of Stainless Steel, the dependable uniformity of Carpenter Stainless makes fabrication easier — production costs lower.

THE CARPENTER STEEL COMPANY • READING, PA.

Carpenter STAINLESS STEELS

BRANCHES AT Chicago, Cleveland, Detroit, Hartford, St. Louis, Indianapolis, New York, Philadelphia

Washington

BY L. W. MOFFETT
Washington Editor

• Reports of increased inventories bring predictions that priorities may be "rather rapidly" extended . . . Price control still finds differences of opinion in the Administration . . . Some industrialists favor return of NRA.

WASHINGTON — Reports of excess buying of stocks is playing an increasingly important part in the attitude of the OPM toward setting up mandatory priorities. That the OPM would rather see a continuation of voluntary preference ratings than to take summary action is clear. At the same time it is equally plain that it is prepared to enforce formal priorities where the occasion demands. This was seen in its first application of that system covering machine tools and aluminum. In both of these cases priorities were fixed because of tight situations arising from actual needs as measured against supplies. There was no question of excess inventories. In both instances the affected industries welcomed the OPM action because it shifted directly to the government the responsibility for not accepting non-defense business.

In other industries, or at least among important groups of them, there is a desire that during the emergency they also be put under a government priority system, thus freeing them from obligations to commercial buyers and from the work of keeping records on stocks in the hands of such purchasers. But neither does the OPM want to extend its priorities any more than is necessary. Operation of the system is difficult, involves a lot of work and time and often means policing of private inventories. Unavoidable rationing or complete denial of supplies dislocates normal production and employment and extends its ill effects to dealers and consumers, whether in automobiles and trucks or in aluminum kitchenware.

Stricter Government Supervision Seen

Being inescapable, predictions are made that priorities may be extended rather rapidly in view of growing reports of tight situations with respect to supplies of national defense needs. The tightness is expected to be only temporary with respect to some materials for which there have been concentrated defense needs, but the condition regarding other materials is expected to call for strict and formal government supervision until the emergency has entirely passed.

In any event priorities are being threatened by reason of reports that industrial consumers are attempting to build up excess inventories. This already has caused the OPM to have the Bureau of Mines undertake a survey of nickel inventories. The suspicion that industrial buyers have been purchasing in excess of their needs has been aroused by reason of the fact that the supplies of nickel in the United States are at record heights. Most of the nickel is imported from Canada. President Robert C. Stanley of the International Nickel Co. of Canada has said that it seems that there is an inflation of demand as compared with consumption.

Like reports are heard regarding other defense needs. It is true of steel, and while the view still prevails that a priority system for steel is not an early prospect, reports multiply that such a system is made more probable regarding some steel products than heretofore if it develops that, despite watchfulness of manufacturers, abnormal stocks are being built up.

It is realized, however, that heavy orders placed with mills have given a misleading impression to the public that industrial consumers are stocking more heavily than is actually the case since there is a great deal of third and even fourth quarter bookings. Rationing already has been applied to structural shapes, stainless and other nickel alloy sheets and all galvanized products. But in tonnage steel the tight situations are expected to be only temporary and then relieved to permit easier and more general flow of supplies after concentrated defense demands have been rolled. During this period of such demand it is especially desired to avoid excess civilian inventories and the consequent necessity of applying formal priorities.

Seek to "Play Down" Strikes

When normal business is dislocated by a shift to defense operations, another of the inevitable effects relates to the price structure. Due to the attitude of industry generally and the good work of the Price Stabilization Division of the National Defense Advisory Commission prices have been well maintained. There are notable exceptions which are proving a serious problem for both the affected industries and the government but in view of strikes and threatened strikes, which mean higher costs, the seriousness of the price situation causes growing concern. Publicly, Washington vainly attempts to play down the seriousness of the labor situation, though patently there is realization of it as a threat to defense production. This is evidenced by the move to set up a board that apparently will resemble the old War Labor Board.

Price control is a matter of differences within the Administration. There is one school of which W. A. Harriman, chief of the OPM Materials Branch is a conspicuous member, that wants a return to NRA days so that industry might cooperate to protect itself against "spiraling prices" with protection during the emergency from prosecution.

"We've been trying to get him to go home for weeks, but he won't believe it's night since we put in the new G-E Fluorescent Lighting!"

THE picture, we admit, is a trifle far-fetched. But it *is* hard to realize it's night outside when you have G-E Fluorescent Lighting *inside!*

Once this new kind of light has been properly installed in your plant or office, nobody can help feeling happier, making fewer mistakes, doing better, faster work with less fatigue . . . from the General Manager on down!

Scientists could give a dozen reasons for this. But the fact is, *our eyes were built for outdoor seeing.* And Fluorescent Lighting is the *closest practical approach yet to real daylight.*

The evidence is overwhelming

Mills, factories, machine shops are enjoying increased production, fewer rejects, better morale under this cooler, more abundant light. In offices, gloom goes out the window. Clerks get less tired, typists make fewer errors. Even the boss does better work in less time.

Where to go for best results

Call your G-E lamp man. Or see your G-E lamp distributor. He can show you certified fixtures, styled to fit *any* requirement of your business, complete with G-E MAZDA F (fluorescent) lamps, ready to hang up and turn on. He can draw on all the experience of General Electric to give you the best possible fluorescent lighting *properly engineered* to your needs—at *low cost!* Your lighting company is also ready to give you valuable up-to-the-minute advice.

1. ***Be sure you get certified fixtures*** with certified ballasts and starters to provide good power factor. General Electric does not make fixtures, but is glad to recommend Certified Fixtures bearing the Fleur-O-Lier or RLM tag.

2. ***Be sure you order G-E MAZDA F lamps*** . . . not just "fluorescent tubes". Benefit from the latest achievements of G-E Research and Development, which already, since 1938, have increased light output of G-E MAZDA F lamps as much as 40% and reduced prices as much as 45%! Like all other G-E lamps, they are *made to stay brighter longer . . . give maximum light for current consumed!*

For free illustrated booklet, "Fluorescent — What it Means in Your Plant," write General Electric Co., Dept. 166-IA-C, Nela Park, Cleveland, Ohio.

NEW LOW PRICES announced January 1st, 1941, on G-E MAZDA "F" lamps. New 5 foot 100 watt size is latest addition to the complete line.

G-E MAZDA LAMPS

GENERAL ELECTRIC

LOWER PRICES ON QUANTITY PURCHASES OF G-E MAZDA LAMPS—*$5 worth for $4—$15 worth for $11.25!*
Also new larger discounts for contract purchasers! See your G-E lamp distributor today!

"There is no doubt in my mind," Mr. Harriman has said, "that the time has come when we should go back to one of the things under the NRA when industry, asked by the government, would be allowed to cooperate in doing certain things without fear of being prosecuted."

Industry definitely would like to be doing more cooperating with the government than it is now doing with respect to price control but it is definitely afraid of later prosecution. It vividly recalls the Madison Oil Case. It is not satisfied with a statement made by Trust Buster Thurman Arnold that there will be no anti-trust action where prices and production are regulated by government defense bodies.

Blue Eagle Out

Industry wants definite, legalized assurance by way of a written law. Some sections of industry apparently favor a return to NRA. To other sections the Blue Eagle is anathema, a moribund old fowl that very properly got it in the neck at the hands of the Supreme Court. Still other business groups without any bias for or against NRA say its return would not provide the machinery actually to agree upon prices and that even though prosecution in the Madison Oil Case followed the demise of NRA the basis for the prosecution grew out of government encouragement under NRA. To which the government replied that the practices were illegal after the Supreme Court handed down its decision.

In any event the Department of Justice is strongly opposed to return of NRA and has said that it will resist any program which will give business groups "acting among their members" a chance to fix prices and production quotas. The Department thinks NRA permitted those practices, though NRA supporters make a contrary contention. The department, however, is said to be favorably disposed to the policy of Leon Henderson, head of the Defense Commission Price Stabilization Division, to determine maximum prices for vital defense supplies.

The outcome regarding price and production control may have to be determined by the White House.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

FOR YEARS I BEEN WANTIN' TO TAKE MY WIFE TO THE GRAND CANYON, SO IF I COULD GET ABOUT A MONTH OFF, WHY---
NOW, DAVE? NOW? WITH THIS WAR WORK-- THIS RUSH-- THIS, UH---
DAVE'S RUN THAT OLD LATHE FER 30 YEARS WITHOUT A DAY OFF-- WHY DIDN'T HE MAKE HIS TRIP WHEN THEY WEREN'T SO BUSY?
WELL, TH' LAST WAR THEY WAS TOO BUSY-- AN' HE DON'T THINK HE KIN LAST TILL TH' NEXT ONE-- AN' WAR TIME IS THE ONLY TIME HE MAKES ENOUGH TO AFFORD A TRIP LIKE THAT!
J.R.WILLIAMS
BOOM TIMES
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Road Building Studied By War Department

Washington

• • • **The War Department** has announced that the need for providing field armies with the latest equipment for taking advantage of modern road construction technique and material was being studied by the Corps of Engineers. Use of bitumens and soil stabilization is included in the study.

Plans are being made now for procurement of several sets of new items of mobile equipment and plants, which may be issued for temporary field training. This equipment may be issued to the General Service Regiment in each of the four armies and to units of the Engineer School and the Engineer Board, at Fort Belvoir, Va.

Since much of the specialized road equipment is bulky and ponderous, it probably will not become organic equipment for the General Service Regiments, but will go to an Army Park Battalion, a unit scheduled to be organized soon.

ICC Opposes Tin Plate Rail Rule Cut "As Proposed"

Washington

• • • **The Interstate** Commerce Commission last week held that proposed reductions in rail rates on tin plate from the Chicago, St. Louis and Birmingham, Ala., districts to Dallas, Houston, Beaumont and Port Arthur, Tex., are not justified, "as published," but said that a formal application may be filed for such fourth-section (long-and-short haul) relief as may be necessary to establish the proposed rates.

Under the proposed reductions, sought by originating carriers to meet water competition, the rates from Chicago to the affected destinations would be cut to 43c. per 100 lb., while the rates St. Louis and Birmingham would be decreased to 35c. At present the rate from Chicago to Dallas is 77c. and to the other Texas points it is 55c. The present rates from St. Louis and Birmingham to Dallas are 74c. and 75c., respectively, while to the other Texas points they are 45c. and 44c., respectively.

Scrap Stocks Show Gain of 11,000 Tons

Washington

• • • **Marking an increase of** only 11,000 net tons, stocks of scrap at consumers' suppliers' plants and in transit at the end of 1940 totaled 7,843,000 tons as compared with 7,832,000 tons at the end of the third quarter of last year, according to the Bureau of Mines. Pig iron stocks declined 139,000 tons to 3,138,000 tons. Scrap supplies at the end of December consisted of 6,006,000 tons of purchased and 1,837,000 tons of home material and were equivalent to a seven-weeks' supply at the rate of consumption that month, a position only slightly changed from that at the end of September. Scrap consumption in December amounted to 4,786,000 tons of which 1,979,000 tons was purchased and 2,787,000 tons was home supplies. Pig iron consumption in December totaled 4,484,000 tons.

Scrap inventories held by larger suppliers decreased 19 per cent at the end of December, with railroad stocks decreasing 26 per cent.

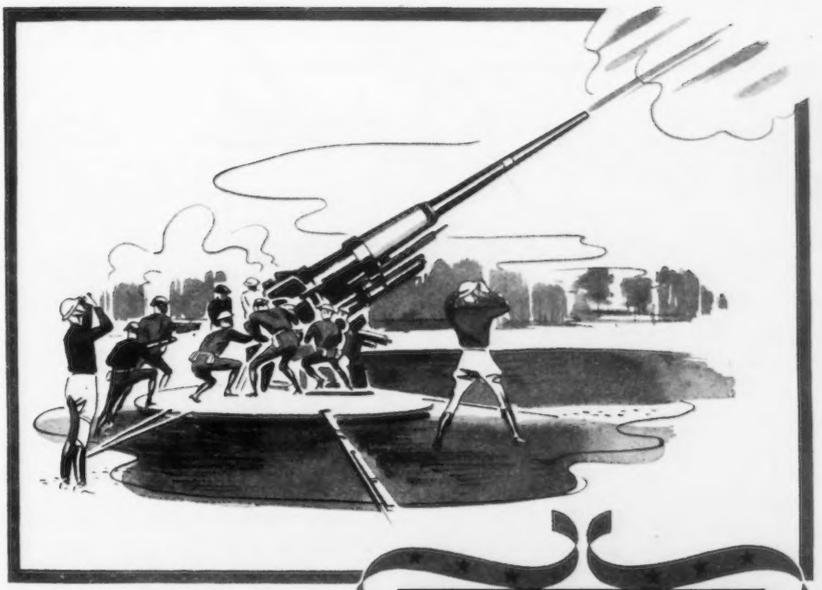
In Western Pennsylvania reported stocks of purchased and home scrap were equivalent to at least a four-weeks' supply at the estimated rate of consumption in December. The district comprising eastern Ohio and West Virginia had a six-weeks' supply and other principal scrap-consuming districts had from a six to eight-weeks' supply available.

Inventories in the New England and western states were equivalent to a 19- and 15-weeks' supply, respectively, while the southwestern states had sufficient scrap to last 120 weeks.

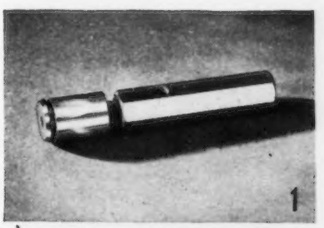
Congress Urged to Broaden Unemployment Insurance

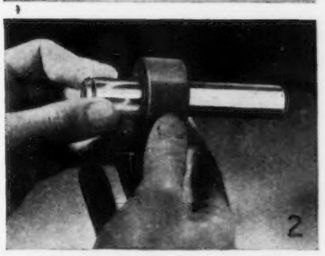
Washington

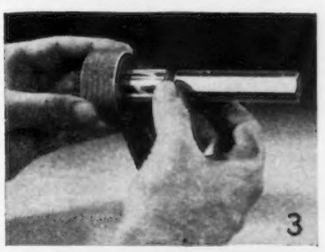
• • • **The Social Security** Board recommended to Congress last week that the base of Federal unemployment compensation insurance be broadened to reach employers of one or more persons. This type of coverage already prevails in several states because of the enactment of specific legislation but generally the tax reaches only employers of eight or more persons.



A DIRECT HIT *Every Time*







Did you ever try to put an ordinary plug gage in a hole that was just one ten thousandth inch larger in diameter? It can be done, of course, but it seldom is the first time.

Pictured below is a Sheffield Guidegage and an ordinary ring gage one "tenth" larger in diameter. One hundred men were asked to slip the ordinary rear end of the plug gage into the ring as in Fig. 2. Only two were able to do it the first time, five on the second trial and 54 required more than ten trials.

Then, each of these men were asked to insert the forward end of the Sheffield Guidegage as in Fig. 3. Every one succeeded the first time. Why? Because of the guiding disc and annular groove which forces the gage to center itself. No skill is needed whatever.

This Guidegage principle is especially advantageous in checking work that must be gaged in an awkward position or while still in the machine, and work which must be held to very close tolerances.

The principle of the Guidegage prevents undue wear and damage to the forward end of the gage, and saves a very considerable amount of time in the gaging operation.

Write for information

★★★ SHEFFIELD GAGE CORPORATION • DAYTON, OHIO, U.S.A. MASTER GAGEMAKERS ★★★

Fatigue Cracks

BY A.H.DIX

Dozens For Every Cook

• • • Our pocketbook nerve used to twitch violently every time we looked over the lists of Government orders (see page 92) published weekly in your favorite family journal. But now we are punch drunk and are able to swallow seven-figure orders without batting an eye.

A recent order, however, gave us, as the saying is, pause. It went to William Scrimgeour, Washington, D. C., and was for $37,350 worth of basting spoons. What a basting spoon is worth, we don't know, but if 10c. is a fair figure, then the Army will soon own 375,000 of them.

Maybe every one of them is needed, but it sounds like an awful lot of basting spoons to us, especially when you consider that turkey is served only twice a year. It may be a small point, but we have just filled out our income tax report and are feeling extra touchy.

Aptronyms

• • • Speaking of military matters, Graham (Baldwin-Southwark) Rohrer writes:

> *"I have just run across two names that fit into your names-that-sound-like-the-job department. They are Brig. Gen. W. P. Boatwright of the Philadelphia Navy Yard and Admiral Washe of the U. S. Navy."*

Boatwright will do, but Shipwright would be better, for if you refer to a large vessel as a boat there is much tensing of naval jaw muscles. Furthermore, what is a brig. gen. doing in a navy yard? Sounds like a case of an army man in ship's clothing.

He Wants the Works

• • • Peering from behind a pillar, we secretly time-studied typical members of the brains department to find out the average amount of time they spend answering inquiries. The answer is 27.8 per cent of their daytime working hours. Questions are answered, we find, with fair celerity and much equability—all but this one from a Baltimorean who isn't even a member of the club:

> *"Send me an alphabetical list of all products made of iron—from stoves and shovels to automobiles. I want this complete."*

Obviously the list would have to include such oddities as *harpaphones, actinometers, froes, garter buckles, gibs, insufflators, bullrings, laryngoscopes, oxygen bomb calorimeters, horse radish graters, gynaecological chairs, stove lid lifters and metal thumb guards.* Here, we thought, is an excellent test of our service. We are happy to report that the brains department member never falterd. He picked it up, read it, sniffed, dropped it into his file basket, and said "The hell with it."

More Inside Information on Merman

• • • We thought that all the printable changes had been rung on Ethel (Panama Hattie) Merman's line, "All the same I'm in the pink, my constitutions made of zinc," but Bill (Amco) McFee comes in after closing time with this, "All the same, I'm far from glum, my svelte figure's aluminum."

But with the heavy demand for metals, we suggest:

All the same, I'm feeling spastic
My constitution's made of plastic.

Tinkle, Tinkle, Little Chuck

• • • Speaking of poetry, John Cotner, v.p. and g.m. of the Logansport Machine Co., maker of air chucks and other things, has this classic under glass on his office wall:

"Dear John:

We have received a letter from Motch & Merryweather Machinery Co., Cleveland, reading as follows:

> With reference to the trouble . . . has been experiencing with the air chuck, their problem has been remedied for the present. However, when the jaws grip the work . . . and while the air is being applied to the cylinder, a tinkling noise is heard in the chuck . . . It lasts for a few seconds. We should appreciate having your explanation of this sound.

The only comment we can make is:

> Tinkle, tinkle, little chuck,
> On to Cotner, pass the buck,
> Call in all the Logan boys,
> Maybe they'll find that damned noise.

We won't take the following as a reply:

> Keep on tinkling, little chuck,
> Why pass on to me the buck,
> What's the matter with Lodge's boys,
> Let them find the blasted noise.

So please advise.

Yours very truly,
THE LODGE & SHIPLEY MACHINE TOOL CO.
J. H. Myers"

Our Cross

• • • At an early age most advertising men acquire the conviction that you are more likely to read an ad if it appears on a right-hand page than on a left. Inasmuch as every publication has just as many right-hand pages as left-hand pages, insane asylums have special wards for publishers who went mad when looking over advertising orders reading, "Must be placed on a right-hand page."

Therefore, three cheers in bold face italics for heretic Louis Honig, research director of Erwin, Wasey & Co., well-known advertising agency, who says in *Sales Management, "a left-hand newspaper page is consistently better than a right-hand page, in spite of the old axiom. . . ."*

Mr. Honig backs up his statement with figures. It will be nice if about half the advertisers agree with him.

Stopper

• • • A stopper of the first water is this sign *The Houghton Line* says appears in a London pharmaceutical shop window:

Bismuth as Usual During Altercations

How Far Is Up?

• • • An anonymous correspondent who has apparently taken one too many Gertrude Steins writes:

> "In 'ceiling' (sealing, welding, etc.) price levels to consider the foundation or bottom, in second hand machine tools. Why? Bottom or foundation creates the ceiling. Without bottom how is it possible to have a ceiling?"

We fell off at the first turn.

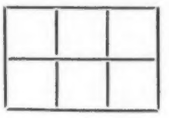
Problems

As you figured out in 20 seconds, last week's cut-up 3-in. cube yielded 8 1-in. cubes with three sides black, 12 with two sides black, six with one side black, and one with no sides black.

Frank G. (Wheeling Steel) Norris asks for an "elegant solution" to the ladder problem:

Two buildings are close enough together that a 20-ft. ladder with its foot touching one of the buildings will lean against the second building. A 30-ft. ladder is placed with its foot against the second building and leaning against the first. The ladders cross 10 ft. above the ground. What is the distance between the buildings?

Or if you are too tired for that you might take away five matches from the arrangement below and leave three squares:



News of Industry

LACKAWANNA STRIKE: Buffalo, N. Y., mounted and foot police are shown leading a car through a SWOC picket line into Bethlehem Steel Co.'s Lackawanna plant. (More than 10 per cent of U. S. defense orders, including ships, are held by the Bethlehem company.)

o o o

OPM Ends Strike At Lackawanna Plant

• • • **A 2-day strike at** Bethlehem Steel Co.'s Lackawanna plant near Buffalo ended shortly before noon last Friday when SWOC leaders accepted a government-drafted plan for its reopening.

Chief gainer in the strike's settlement was the public which had seen the national defense program threatened by the walkout at a plant of a large company vitally important to rearmament.

The basis for settlement of the Lackawanna walkout, which followed dismissal of about 250 workers charged with staging slowdowns for an hour a day for 10 days, was laid by the OPM through William S. Knudsen, director general, and Sidney Hillman, associate director. This 3-point agreement was outlined by Mr. Knudsen as follows:

"**Office of Production** Management, in the interests of the national defense program, is proposing that all employees of the Lackawanna plant of the Bethlehem Steel Co. be fully reinstated as soon as resumption of operations will permit.

"Also, that a conference will be immediately held between the Lackawanna plant management and officials of the SWOC with a view to adjustment of misunderstandings and grievances there.

"The OPM will explore with the National Labor Relations Board the possibility of holding an election to determine the bargaining agency at the Lackawanna plant."

The OPM offer was announced after a meeting of Messrs. Knudsen and Hillman with Joseph M. Larkin, vice-president, and Hoyt A. Moore, general counsel, of Bethlehem Steel Co. The terms of the offer may be compared with the conditions under which the SWOC leaders, Philip Murray, chairman, and Van A. Bittner, regional director, earlier had agreed to call off the strike. These conditions were:

"1—Reinstatement of all men fired and suspended by Bethlehem Steel to their jobs with full seniority.

"2—An immediate conference between the union and management to settle all existing grievances that have arisen within the Lackawanna plant.

"3—The Bethlehem Steel Corp. to agree to an immediate consent election under the auspices of the National Labor Relations Board among its employees in the Buffalo area and engage in collective bargaining with the SWOC in the event it is chosen as their representative."

An early demand for a 25 per cent wage increase by SWOC leaders at Buffalo was dropped but John V. Riffe, SWOC spokesman told a union meeting at Buffalo that "we are here to celebrate the greatest victory that has ever been won in the history of the labor movement in this or any other country."

↓ ↓

• • • **An attack on** large industries which have not increased wages was made last week at Atlantic City by Philip Murray, head of the CIO and SWOC. (Murray's union is now seeking to negotiate a wage increase with U. S. Steel Corp.)

"Unfortunately," Murray said, "the attitude of American industry is one of absolute, positive refusal to make wage concessions of any description. They contend that if the wage structure is improved and men and women are given more money that it might result in something they call inflation. So they suggest, these leaders of American industry, very bluntly, very boldly, that nothing should be done in the United States of America during the period of national defense to improve living standards or to increase wages and that at the same time nothing should be done in the United States by government, labor or industry to disturb the profit-making opportunities of American industry."

(Editor's Note: From 1930 to 1938 the steel industry earned an average of 1.5 per cent on its investment.)

Photo Wide World

DEFENSE PRODUCTION BOARD: Members of the newly appointed Production Planning Board are, left to right, seated, Harry L. Hopkins; Samuel R. Fuller, chairman; John D. Biggers, Director of Production, and Admiral William H. Standley. Standing: James B. Carey; Robert E. Doherty; William E. Lewis; John L. Pratt, and Major General James Henry Burns.

Here Are Leaders of Production Planning

• • • **The new 9-man** U. S. Production Planning Board includes Samuel Richard Fuller, chairman, the president of North American Rayon Corp., and Harry L. Hopkins, former Secretary of Commerce and former WPA director.

No newcomer to defense planning, Mr. Fuller had full charge of steel and machine tool procurement for the Navy during the World War and won high commendation from Bernard M. Baruch and others for his services. Mr. Fuller's earlier years were spent in the steel and malleable castings industry.

In addition to Mr. Fuller and Mr. Hopkins, the new board consists of:

Admiral William Harrison Standley, retired, chief of Naval Operations, 1933-1937.

Maj. Gen. James Henry Burns, whose duties include assignments in the office of the Chief Ordnance Officer.

George W. Meany, secretary-treasurer, American Federation of Labor and former president of the New York State Federation of Labor.

James B. Carey, secretary of the Congress of Industrial Organizations and general president of the United Electrical, Radio and Machine Workers of America.

John L. Pratt, Fredericksburg, Va., former executive vice-president of General Motors Corp. in charge of all parts and accessory divisions. He has had broad experience in the chemical and mechanical industries and has made a study of industrial mobilization as a member of the War Resources Board.

William E. Levis, Toledo, Ohio, chairman of the board of the Owens-Illinois Glass Co. in addition to broad manufacturing experience in the glass container, metal, paper and plastic fields, has a distinguished record of active service in the infantry during the World War.

Robert E. Doherty, president of the Carnegie Institute of Technology. He is a member of the American Institute of Electrical Engineering as well as of the Society for the Promotion of Engineering. He is co-author of Mathematics of Modern Engineering.

Conway Sees More U. S. Control Over Industry

Los Angeles

• • • **Every intelligent** business man knows that the government will have more and more to say as to how business is to be conducted, with the tendency for more centralized control, rather than less, Carle C. Conway, chairman of the board of Continental Can Co., Inc., said in an address here.

39 of 40 Akron Shops Have Idle Capacity

Akron, Ohio

• • • **Accustomed to high** production, this city is cooperating in the national defense program yet has escaped the boom-like atmosphere now apparent in some industrial centers.

Orders allocated here are reported to total around $200,000,000, mostly in subcontracts, but the Rubber City refuses to become excited by its importance. In most cases, the city's plants have been able to take on additional government business by utilizing already existing space.

A survey of 40 machine shops recently made by the Akron Chamber of Commerce shows that the potential manufacturing facilities of Akron have yet to be overtaxed. Thirty-nine of the shops indicated that they could increase their production schedules materially without a similar increase in manufacturing space. The fortieth plant, now handling defense orders 24 hours a day, could only increase its schedules by building additional plant facilities.

All plants but five already are filling defense orders ranging from huge lathes and planers for ordnance production to minute molds and machine tools.

A Chamber of Commerce survey was made to discover Akron's "lost legion" of skilled mechan-

Coming Events

March 3 to 7—American Society for Testing Materials, spring meeting, Washington, D. C.

March 13 to 14—Society of Automotive Engineers, national aeronautic meeting, Washington, D. C.

March 17 to 22—Oil Burner Institute meeting, Philadelphia.

March 25 to 29—American Society of Tool Engineers, Machine and Tool Progress Exhibit, Detroit.

April 16 to 18—Electrochemical Society, Inc., spring meeting, Cleveland.

April 23 to 25—Concrete Reinforcing Steel Institute, annual meeting, Hot Springs, Va.

May 5 to 7—American Gear Manufacturers Association, annual convention, Hot Springs, Va.

ics, those workers who although trained in machine work now are either engaged in unskilled tasks or are retired completely because of partial age, disability or other factors.

The search brought response from over 300 men, about 75 of whom were capable of immediate employment. The others needed additional training or were permanently unemployable.

The story of the Chamber's quest apparently went all over the country, for inquiries came from cities in almost every state. One of the most interesting cases brought to light was that of an elderly man trained in mechanical engineering but working as a small-salaried policeman. He now is a $250 a month shift foreman in a machine shop.

Akron's big role in national defense has been as subcontractor; only about $20,000,000 in contracts have come directly from the Army and Navy.

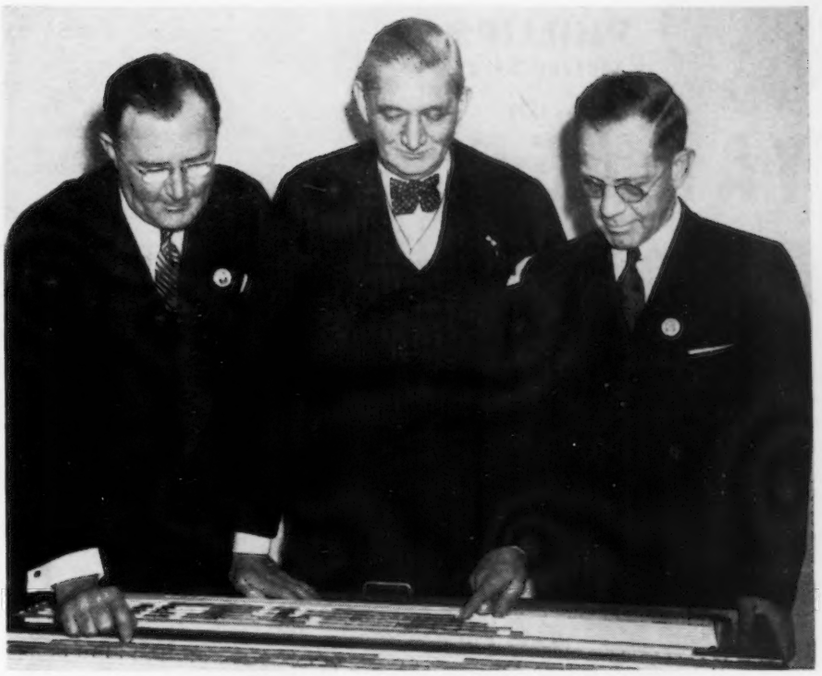
A few of the materials supplied include gasoline lanterns, navy boilers, armor plate, tires and inner tubes, endless band tracks for tanks, airplane wheel assemblies, machine gun clips, tank blocks, gas masks, rubber gloves, airplane de-icer shoes, oil and fire extinguisher hose, pneumatic life rafts, motor generators, cotton mattresses, navy blimps and thousands of other essential items.

The demand for synthetic rubber has been tremendous in recent months, so much so that Washington officials have warned steps toward allocations may be necessary, a temporary measure until new production facilities are available.

Rubber plays a very large part in modern mechanized warfare. Not the least of the new applications are self-sealing fuel tanks for airplanes.

Results of Akron's increased production have not reached boom proportions. No one wants them to. But the general business picture in Akron indicates a growing and healthy prosperity.

Employment is good and promises to be even better in the coming months. Time clock workers in the district's six tire and tube factories now number well over 33,000, the highest employment in four years.



William S. Knudsen, OPM director, is shown a production chart of General Electric Co.'s $350,000,000 of defense orders by Charles E. Wilson, left, G-E president, and Chester H. Lang, chairman of G-E's defense committee, right. Knudsen said he was well satisfied with the company's production program.

Tool, Aluminum Ratings Extend To U. K.

Washington

• • • **Machine tools and** aluminum for British defense requirements were given equal standing with orders for the Army and Navy under instructions issued last week by the Priorities Division of the Office of Production Management. The instructions supplemented the action taken on Feb. 24 when machine tools and aluminum were subjected to a mandatory priorities status.

Director of Priorities Edward R. Stettinius Jr., explained in letters directed to aluminum and machine tool manufacturers that the instructions were necessary "to avoid any misunderstanding" on handling British defense orders.

It is the intent of the Priorities Division, the letter said, that "orders for aluminum (or machine tools as the case may be) to be used directly or indirectly in filling British defense orders shall be given the same priority status as that granted for similar material to be used in, or in the making of, corresponding products for the Army and Navy.

"If this result cannot be achieved without our assistance, please communicate the known facts directly to this office and we will advise you how to deal with the matter."

Summerill Opens Aircraft Steel Welding Contest

• • • **The Summerill** Tubing Co., Bridgeport, Pa., is establishing a series of prizes to be awarded by the American Welding Society at its annual meeting during October, 1941, for papers to advance the art of welding of aircraft steels including tubing and other steel parts for tubular assemblies. The papers may treat of any type of welding which is or can be used for the fabrication of structures or assemblies in the production of aircraft steels such as 1025, X4130, X4135, X4340 or similar steels. They may cover any phase of the problem whether concerning joint design, fabrication or laboratory investigations. For further information, apply to the American Welding Society, 33 West 39th Street, New York.

DRIVE PHILLIPS Recessed Screws with "YANKEE"

QUALITY SCREW DRIVERS

—Two Styles—
HEAVY DUTY
and
REGULAR

HEAVY DUTY
No. 901–1 Point
No. 902–2 Point
No. 903–3 Point
No. 904–4 Point

REGULAR
No. 941–1 Point
No. 942–2 Point
No. 943–3 Point
No. 944–4 Point

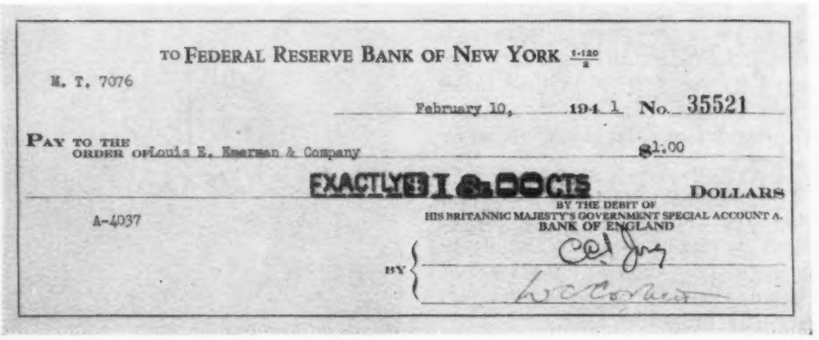
"YANKEE" PHILLIPS BITS
for use in all
"YANKEE" SPIRAL SCREW DRIVERS

PHILLIPS LIC. 3 Patent Nos. 2046837-2046840-2066372.

"Yankee" Phillips screw driver blades and bits are of special alloy steel; the best obtainable for the purpose. They are hardened and tempered to the proper degree for the driving of Phillips Screws, including the sheet-metal, self-tapping types of screws which are being used very extensively.

Write us for further details.

NORTH BROS. MFG. CO.
Dept. 1A Philadelphia, U.S.A.



TO FEDERAL RESERVE BANK OF NEW YORK

M. T. 7076

February 10, 194 1 No. 35521

PAY TO THE ORDER OF Louis E. Emerman & Company $1.00

EXACTLY $1 & 00 CTS DOLLARS

A-4037

BY THE DEBIT OF HIS BRITANNIC MAJESTY'S GOVERNMENT SPECIAL ACCOUNT A. BANK OF ENGLAND

BY

HIS MAJESTY'S CHECK: Pictured here is a check for $1 drawn for his Britannic Majesty's Government (Special Account A, Bank of England) in favor of Louis E. Emerman Co., Chicago. The Emerman firm last month devised a plan whereby any company producing goods for the defense program and able to prove it had ordered a new machine could lease used machine tools for $1 a year. Three hundred and fifty such machines have been taken by the British government.

Dravo Corp. Acquires Hunter Steel Plant

Pittsburgh

• • • **In order to** provide additional fabrication and structural shop facilities to meet an increasing amount of business, particularly in reference to defense orders, Dravo Corp., on May 1, will take over the plant and facilities of the Pittsburgh Coke & Iron Co.'s Hunter division on Neville Island, near here.

The Hunter division, before being acquired by Pittsburgh Coke & Iron, was called the Hunter Steel Co. and previous to that time was known as the Independent Bridge Co. Dravo will complete outstanding orders of Hunter "including 20 to 30 barges."

The transfer includes a shop area of about 12,000 sq. ft. and the approximately 250 men employed will be retained.

Republic to Sell $90,000,000 of Bonds

• • • **Republic Steel Corp.** filed recently with the Cleveland office of the Securities and Exchange Commission a registration statement covering $90,000,000 of new securities to enable the company to carry through a broad refinancing program. The new securities registered consist of $65,000,000 20-yr. first mortgage sinking fund bonds and $25,000,000 15-yr. convertible sinking fund debentures. Coupons, redemption prices, and offering prices will be announced later.

Ohio to Get Its First Aviation Gasoline Plant

• • • **The first aviation** gasoline plant between the Eastern seaboard and the Chicago area will be constructed by Standard Oil Co. of Ohio, with completion scheduled for about Nov. 1. The new unit will produce 100 octane aviation gasoline by a sulphuric acid alkylation process. It will have an annual capacity of several million gallons.

Western Pipe & Steel Constructs New Plant

San Francisco

• • • **Western Pipe & Steel Co.** has begun construction of a new $125,000 fabricating plant at Fresno, Cal., replacing its present structure here. The plant will be of steel frame construction, comprising three parallel bays with adjacent office and warehouse, and covering nearly 50,000 sq. ft. of a four-acre site. New equipment will be installed, including modern flash welding equipment for water well casings.

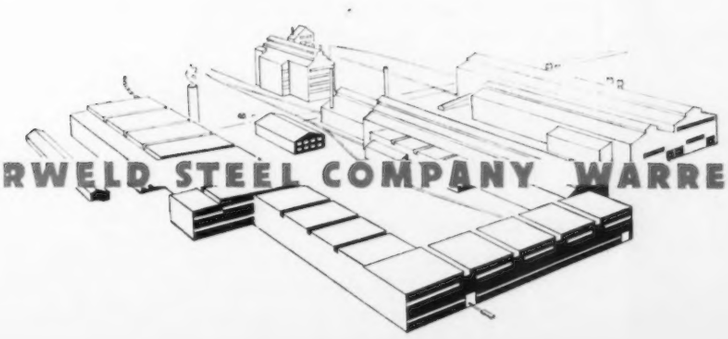
Products to be fabricated include tanks, water well casings, culverts, sheets, light plate, and structural steel items. The plant is scheduled for completion in about 90 days.

Western Pipe & Steel Co. has main offices in San Francisco, fabricating plant and shipyards at South San Francisco, and fabricating plant at Los Angeles.

Increased Melting Capacity for ARISTOLOY STEELS--

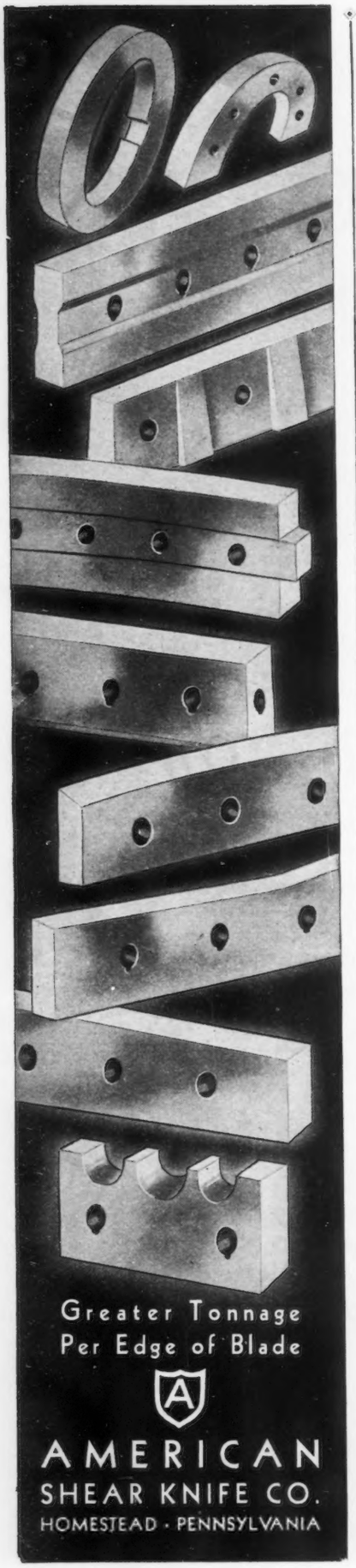
-not "on order" but ready NOW

Two new top-charged electric furnaces have been added to Copperweld Steel Company's melting department, an increase in melting capacity of approximately 7000 tons a month. More annealing and heat-treating units and other finishing equipment have also been added. With this new equipment, working 24 hours a day, 7 days a week, we are making every effort to take care of our customers' needs for Aristoloy steels.



COPPERWELD STEEL COMPANY WARREN, OHIO

ARISTOLOY S.A.E. ALLOY BILLETS AND BARS; OXIDATION AND CORROSION RESISTING STEELS; TOOL AND SPECIAL STEELS; AIRCRAFT QUALITY STEELS; STAINLESS STEELS



Defense Lectures for Detroit Foundrymen

Detroit

• • • **Cooperation of foundries** supplying iron, steel and non-ferrous castings is being enlisted for the national defense program, since these materials are vital in many types of military equipment. As a means of aiding foundrymen in this work, the Detroit Chapter of the American Foundrymen's Association has scheduled a series of six educational lectures on the subject "Production of Better Castings."

Problems and techniques are to be surveyed by eight nationally known foundry engineers and metallurgists at the Chemistry Building Auditorium, University of Detroit. The first lecture was scheduled for Friday, Feb. 28. Others will be on March 7, 14, 21, 28 and April 4.

Subjects and speakers, in order, are: "Melting by the Cupola Process," by H. S. Austin, foundry metallurgist, Buick Motor Division, Flint, Mich.; "Molds, Gates, Risers and Cores," by Charles Carson, foundry superintendent, National Supply Co., Toledo, O.; "Sands, Cores and Refractories as They Affect Physical Properties," by Harry W. Dietert, president, H. W. Dietert Co., Detroit; "Metallurgy of Ferrous Metals," by A. L. Boeghold, chief metallurgist, General Motors Research Laboratories, Detroit, "Steel and Malleable Castings," by R. J. Wilcox, metallurgist, Michigan Steel Casting Co., Detroit, and Carl Joseph, metallurgist Saginaw Malleable Division, Saginaw, Mich.; and "Quality Aluminum and Magnesium Castings," by H. J. Rowe, metallurgist, Aluminum Co. of America, Cleveland, and L. Brown, plant manager, Magnesium Fabricators, Inc., Adrian, Mich.

Lectures are open to all foundrymen and interested engineers and apprentices in the Detroit area. Applications for registration should be addressed to E. K. Smith, Electro Metallurgical Co., Ford Building, Detroit, chairman of the chapter's educational committee. Nominal charge will be made for attendance.

PROGRESS IN HOUSEHOLD EQUIPMENT: The Laundromat, an automatic cycle washing machine with numerous revolutionary engineering developments, has been announced by Westinghouse Electric & Mfg. Co., Mansfield, Ohio. The machine makes liberal use of stainless steel.

Republic Spends $9,500,000 On Defense Equipment

Cleveland

• • • **Republic Steel Corp.** has appropriated more than $9,500,000 since the middle of 1940 to increase its facilities for the production of materials needed by the national defense program.

Items included are five additional electric furnaces having a capacity of 280,000 tons per year, facilities for heat treating and cleaning defense type steels, installation of equipment for the production of light armor plate, and facilities for increasing the production of aircraft and special steels needed for national defense.

In addition to these expansions, the purchase of a large quantity of specialized machinery has also been authorized.

The improvements have been allocated in Canton and Massillon, Ohio; Gary, Ind.; Beaver Falls, Pa.; Buffalo, N. Y., and Gadsden, Ala.

Only PORTER BUILDS A *COMPLETE* LINE OF LOCOMOTIVES FOR INDUSTRY

More and more concerns are putting their switching problems up to Porter. For Porter builds *all* types of industrial locomotives, hence can afford to be impartial in recommending the type best suited to *your* needs.

Porter's 75 years of experience in locomotive design and construction is your assurance that Porter locomotives are better-built—that they move more tons per dollar invested—that they pay off in increased haulage efficiency.

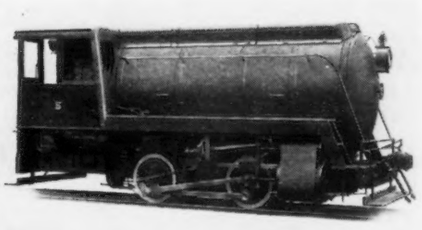
Take advantage of these years of experience. Call in the Porter engineer and secure an *unbiased* opinion on the type and design of locomotive best suited to your specific requirements. Write us for complete information.

PORTER "better built" locomotives

NO MATTER WHAT TYPE YOU REQUIRE

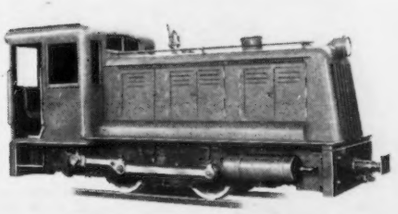
DIESEL
DIESEL ELECTRIC
GASOLINE
GAS-ELECTRIC
STEAM
FIRELESS STEAM
COMPRESSED AIR

Typical PORTER installations made during recent months

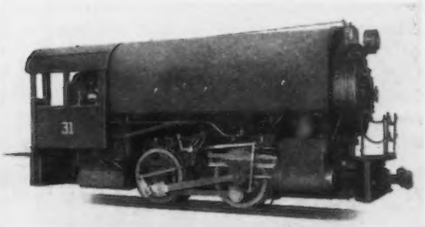


Fireless Steam for Chemical Plant

44-Ton Diesel-Electric Railroad Switcher



Diesel-Mechanical for Copper Mine

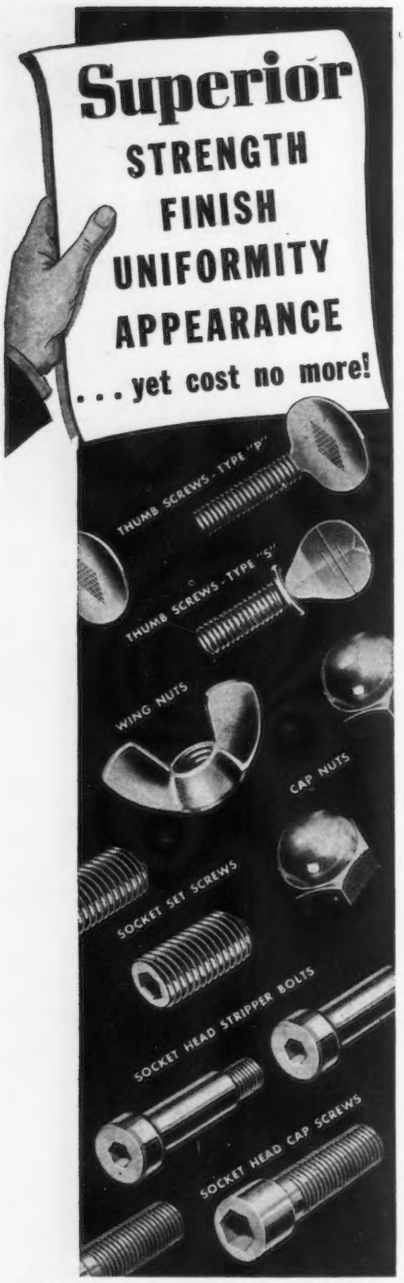


Heavy Duty Steam for Steel Mill

H. K. PORTER COMPANY INC.

ESTABLISHED 1866 PITTSBURGH, PA.

NEW YORK: 44 Whitehall St. CHICAGO: 310 So. Michigan Ave.



THE *cold-forging* process developed by Parker-Kalon is the reason why these Parker-Kalon Products excel in so many features. And unequalled production facilities and equipment supply the reason why Parker-Kalon *Cold-forged* Wing Nuts, Cap Nuts, Thumb Screws and Socket Screws cost you no more. Ask for free samples and prices. No obligation, of course. PARKER-KALON CORP., 200-202 VARICK ST., NEW YORK, N. Y.

PARKER-KALON
Cold-forged
SOCKET SCREWS
WING NUTS · CAP NUTS
THUMB SCREWS
SOLD THROUGH
REPUTABLE DISTRIBUTORS

Tin Smelter Will Be Built at Texas City

Washington

• • • **Federal Loan Administrator** Jesse Jones has announced that a tin smelter will be built on the Texas City channel at Texas City, Texas, across the bay from Galveston, at an estimated cost of $3,500,000. The deciding factors for choosing this location, according to Mr. Jones, were cheap gas for fuel; available hydrochloric acid at low cost from a nearby refinery; good terminal, port and warehouse facilities; a large movement of foreign cargo ships into the Galveston-Houston Marine district, making it possible to move less than cargo lots of tin concentrates coming from South America; and availability of barge movement of finished tin to market. A desirable site, it was stated, was donated by the Texas City Terminal Co.

The smelter will be built by Tin Processing Corp., New York, a subsidiary of N. V. Billiton Mattschappij of the Dutch East Indies, the principals in which are experenced in smelting Bolivian ores in England, as well as tin in the Dutch East Indies. The plant will be entirely owned by the United States government and operated for its account, with an option to take over or change the management at stated periods. The smelter will have a capacity of 50,000 tons of tin concentrates, or 18,000 tons of fine tin.

The Army and Navy Munitions Board and the National Resources Planning Board recommended that the smelter should be located in the Gulf area.

↓ ↓

New York

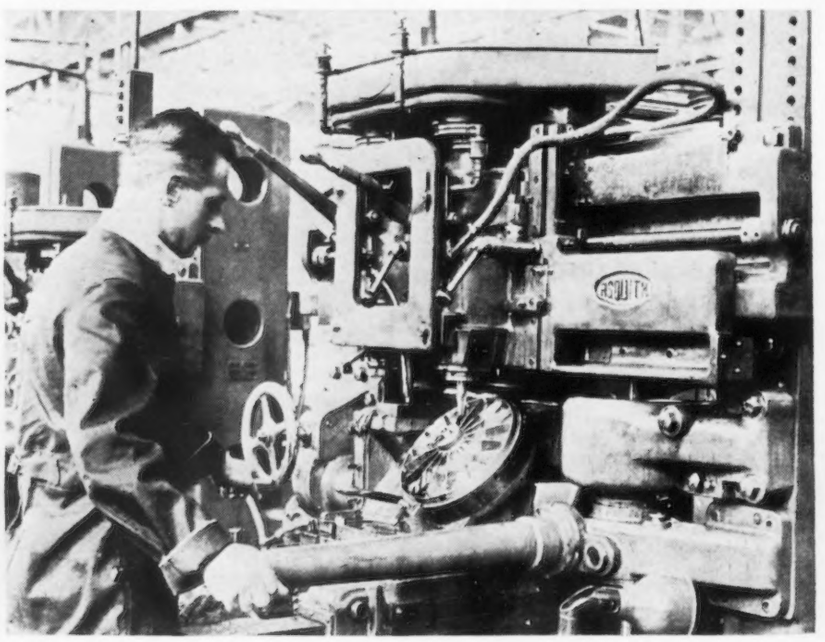
• • • **Grace Line officials at** New York announced that the company would inaugurate a new freight service between Gulf ports of the U. S. and western ports of South America to carry raw materials for the new smelter at Texas City, Texas.

DeVilbiss Veterans Honored

Toledo

• • • **Five employees** of the DeVilbiss Co., with service records of 25 yr. have been awarded diamond badges and $100 each by the company. The awards went to Clement Lydey, Herbert Wanner, Ruth Kopfman and Mrs. Fawn Wechtel of Toledo, and Lemuel H. Schmock of Chicago.

SHADOW FACTORY: This photo, according to the British caption shows the milling of impellers in the Messrs. Rootes' government aircraft factory in the bombed city of Coventry, Eng. *Photo by Harris & Ewing*



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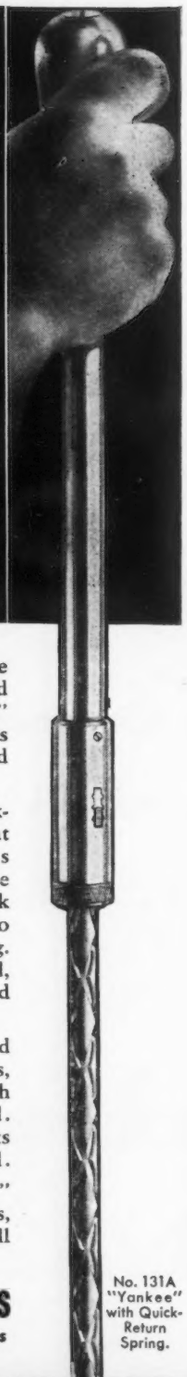
"QUALITY WELD METAL EASILY DEPOSITED"

Distributors Warehouse Stocks in the Following Cities:

ATLANTA, GA.	*J. M. Tull Metal & Supply Co.*
BUFFALO, N. Y.	*Root, Neal & Co.*
BORGER, TEXAS	*Hart Industrial Supply Co.*
BOSTON, MASS. (Belmont)	*H. Boker & Co., Inc.; W. E. Fluke*
CHICAGO, ILL.	*Machinery & Welder Corp.*
CINCINNATI, OHIO	*Williams & Co., Inc.*
CLEVELAND, OHIO	*Williams & Co., Inc.*
COLUMBUS, OHIO	*Williams & Co., Inc.*
DETROIT, MICHIGAN	*C. E. Phillips & Co., Inc.*
ERIE, PENNA.	*Boyd Welding Co.*
FT. WAYNE, IND.	*Wayne Welding Supply Co., Inc.*
HONOLULU, HAWAII	*Hawaiian Gas Products, Ltd.*
HOUSTON, TEXAS	*Champion Rivet Co. of Texas*
INDIANAPOLIS, IND.	*Allied Weld-Craft, Inc.*
KANSAS CITY, MO.	*Welders Supply & Repair Co.*
KINGSPORT, TENN.	*Slip-Not Belting Corp.*
LOS ANGELES, CALIF.	*Ducommun Metals & Supply Co.*
MILWAUKEE, WIS.	*Machinery & Welder Corp.*
MOLINE, ILL.	*Machinery & Welder Corp.*
NEW YORK, N. Y.	*H. Boker & Co., Inc.*
OKLAHOMA CITY, OLKA.	*Hart Industrial Supply Co.*
PAMPA, TEXAS	*Hart Industrial Supply Co.*
PITTSBURGH, PA.	*Williams & Co., Inc.*
PORTLAND, OREGON	*Industrial Specialties Co.*
SAN FRANCISCO, CALIF.	*Ducommun Metals & Supply Co.*
SEATTLE, WASH.	*H. A. Cheever Co.*
ST. LOUIS, MO.	*Machinery & Welder Corp.*
TOLEDO, OHIO	*Williams & Co., Inc.*

SPEED UP WITH "YANKEE" SPIRALS



Because they increase output, save time and labor, "Yankee" Spiral Screw Drivers will help you speed production.

Available with "quick-return" spring that automatically keeps bit in position while bringing handle back for next stroke. Also made without spring. All have right-hand, left-hand ratchet and rigid adjustments.

Light, standard and heavy patterns. Sizes, from 12⅜" to 28" with spindle extended. Exposed metal parts chromium plated.

Order "Yankee" Spirals, Vises, Drills, etc., from your Mill Supply House.

"YANKEE" TOOLS
make better mechanics

No. 131A "Yankee" with Quick-Return Spring.

Three sizes tested "YANKEE" bits with each driver.

NORTH BROS. MFG. CO.
PHILADELPHIA, U. S. A.

High School Students Trained By Westinghouse

Sharon, Pa.

• • • **Westinghouse Electric** & Mfg. Co., here, is training draftsmen quickly by swapping working hours for classroom periods in the local high schools.

Thirty-seven top students who had completed at least four semesters of mechanical drawing were selected and in seven weeks completed a course normally requiring many months.

They spent the working hours at the plant learning the standard methods and practices of Westinghouse draftsmen under the direction of a full-time instructor assisted by engineers experienced in the various fields of transformer design and production. The work simulated that given to full time draftsmen and also included the study of manufacturing operations. Elementary physics, electricity and magnetism, and transformer principles were a part of the training program.

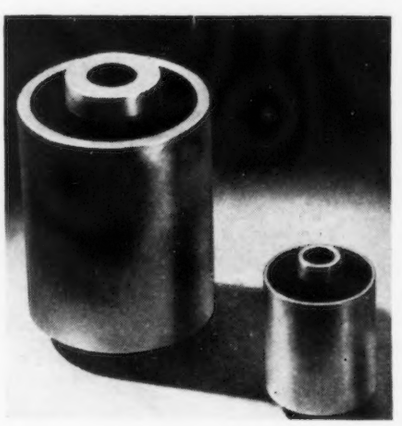
Near the end of the course each student reported on classroom work, the instructors, and shop trips. These reports with constructive criticism will be used as a guide in the conduct of future classes.

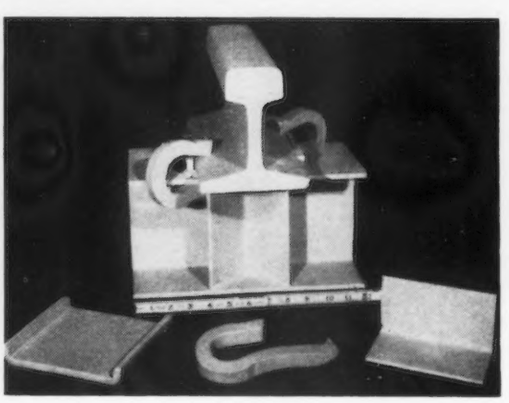
At Canton, Ohio, plans to train selected unemployed men under the national defense training program for specialized machine operating jobs in the $16,000,000 naval ordnance plant under construction near here have been announced. O. J. Manse, Pittsburgh, supervisor of trades and training for the navy plant, will interview and select unemployed persons for the training.

Bridge Design Prizes Awarded by A.I.S.C.

• • • **Prizes in the** Annual Students' Bridge Design Competition have been awarded by the American Institute of Steel Construction as follows: $200, Vincent W. SeeBach, New York University; $100, R. Kenneth Kendall, Iowa State College; $50, M. R. Harrison, Jr., Iowa State College. Problem for this year's competition was a steel overpass bridge carrying a single track railroad over a highway.

RESISTANCE TO OZONE ATTACK: Features of a new line of aircraft engine and cowl mountings developed by Harris Products Co., Detroit, include resistance to ozone at high altitudes, to oil and salt air corrosion. Using a mechanical rather than a chemical bond, the company reports, two stainless steel tubes are separated by a wall of Neoprene to form a vibration and shock absorption mounting with a rated capacity of 150 lb. per sq. in. shear load.

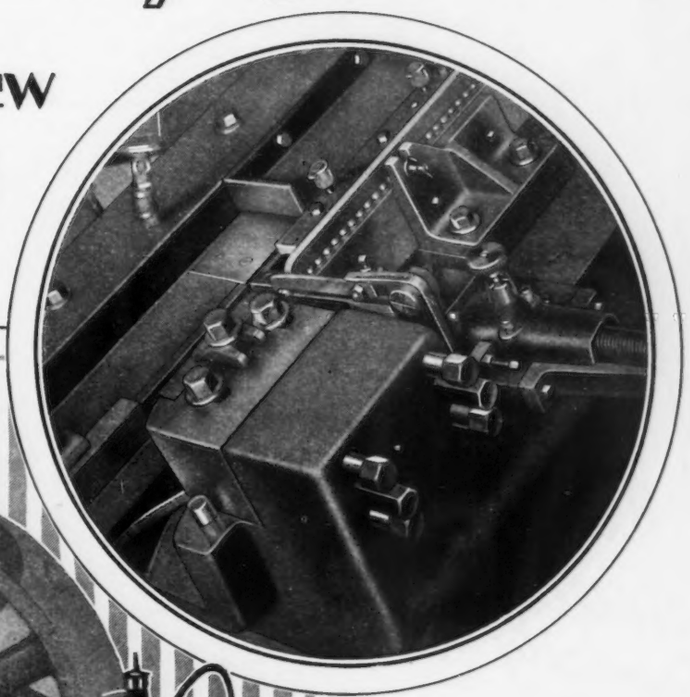


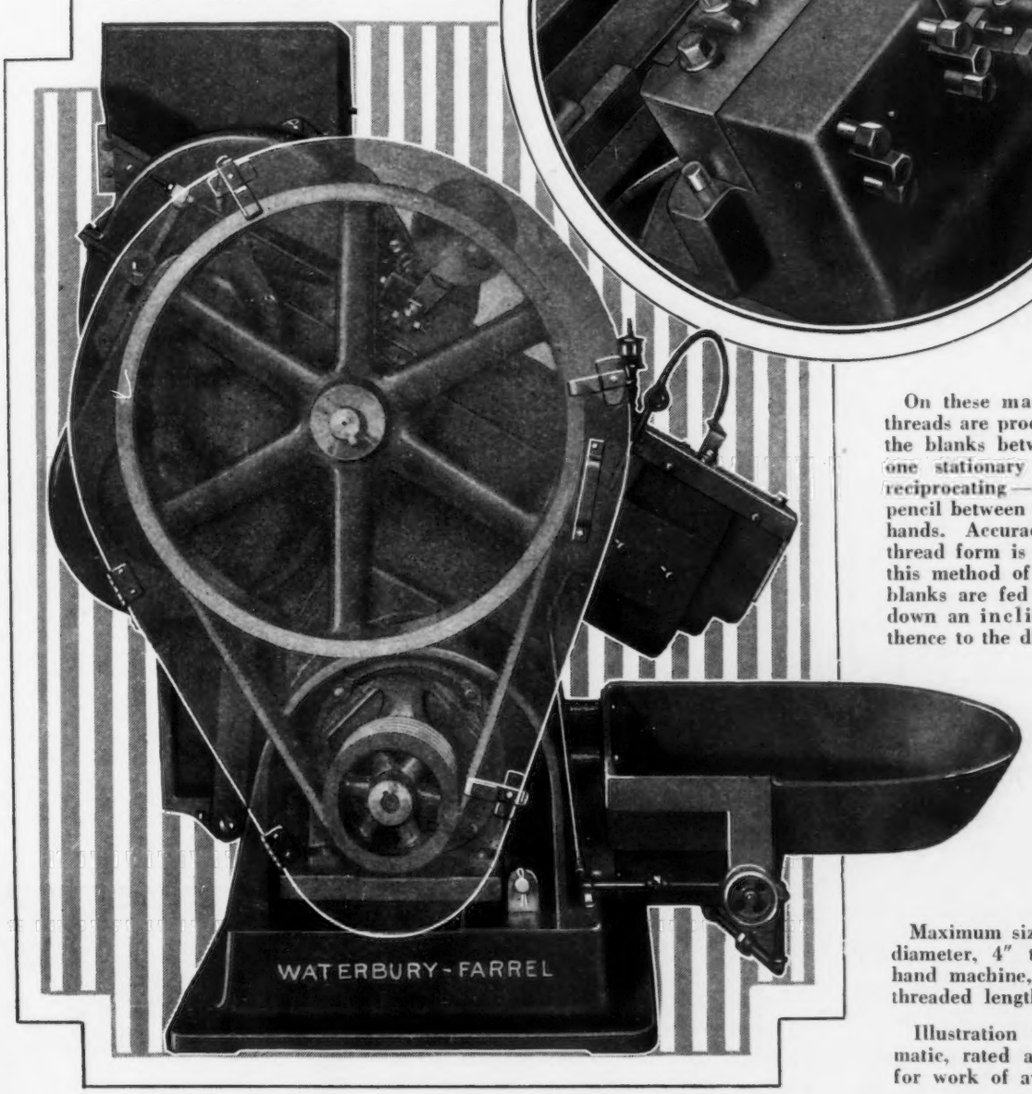


NEW H-BEAM TIE: Bethlehem Steel Co. has developed this new H-beam tie for use in mine and industrial tracks. Gage of the track is definitely fixed at place of manufacture by two double-shouldered 3-8 in. tie plates, 5½ in. wide, arc welded to the 6 in. H-beam which is 8 ft. long and weighs 15½ lb. a foot. Four 3 x 3 x ¼ in. angles are arc welded directly beneath the tie plates between the two flanges of the beam, to act as stiffeners and retainers for the spring clamp.

Waterbury-Farrel

Automatic Screw Thread Rolling Machines...





On these machines, screw threads are produced by rolling the blanks between two dies—one stationary and the other reciprocating—like rolling a pencil between the palms of the hands. Accuracy in lead and thread form is characteristic of this method of threading. The blanks are fed from a hopper, down an inclined chute and thence to the dies.

Maximum size automatic, ½" diameter, 4" threaded length; hand machine, 1" diameter, 5" threaded length.

Illustration shows ⅜" automatic, rated at 75 per minute for work of average length.

The Waterbury Farrel Foundry and Machine Co

MACHINERY FOR BOLTS, SCREWS, RIVETS, NUTS, RODS, SPOKES, ETC.

HOME OFFICE AND WORKS: Waterbury, Conn. SALES OFFICES: Cleveland, Chicago and Newark, N. J.

Originally, boilers in this steam plant were served from the ground floor. Then demand jumped. Additional boilers (plus a plant addition) were considered. The other way was to excavate *under* existing boilers and thus increase fire box size, heating surfaces, steam capacity. But that raised the problem of removing ashes from the newly-created basement.

This inexpensive Reading Electric Hoist solved the problem in the most economical way. Plant manager states, "Never a repair."

The illustrated book suggests equally satisfactory answers to 144 hoisting problems. Write for your free copy.

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Chain Hoists, Electric Hoists,
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More Products Added to Steel Export Licensing List

Washington

• • • **President Roosevelt** by executive order effective Feb. 15 subjected an additional list of iron and steel products to the export licensing law, under which designated exports are prohibited unless a license is obtained from the State Department's Division of Controls. Products added to the list included:

1. Alloy steel (including stainless) ingots, blooms, billets, slabs, sheet bars and tin plate bars; iron bars, and terneplate, including waste terneplate;

2. The following classified as steel mill manufactures: switches, frogs, crossings, and derails; rigid electrical conduit of iron or steel; wire rope and cable, uninsulated; electric welding rods and wire of iron or steel; welding rods and wire of iron or steel (other than electric); bale ties; electrical and telephone transmission wires of iron or steel coated with aluminum, copper or other metals; insulated wire and cable having an iron or steel core; twisted wire; other coated wire of iron or steel, and ingot molds;

3. The following classified as advanced manufactures: metal drums and containers filled or unfilled, for oil, gas, and other liquids, and tool bits or tool bit blanks.

Bethlehem Enlarges Rod-Making Capacity

• • • **With installation** of a second group of finishing stands, and additional coiling, conveying and storage facilities, the continuous high-speed rod mill at the Maryland plant of Bethlehem Steel Co. is now equipped for rolling four strands of rod at one time. The extension roughly doubles the rod making capacity of the mill, increasing it from 500 to approximately 1000 tons of No. 5 rod per 24 hr., the company reports.

The mill was built nearly three years ago and though at the outset it rolled only two strands of rods, it was designed for ultimate four-strand operation. A second rod finishing mill has been installed.

National Supply Installs Shell-Forging Equipment

Pittsburgh

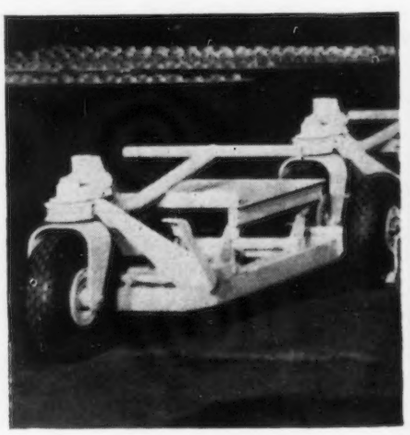
• • • **National Supply Co.** is expected to start production next month at a new shell forging plant now being installed at its Ambridge, Pa., works, according to Alexander E. Walker, president.

Mr. Walker says that the company has booked approximately $7,000,000 in defense contracts, principally for diesel engines, shell forgings, gears, and airplane parts. The company, it was said, is in a position to take more defense orders during 1941 and when required is expanding plant capacity and installing new machinery.

"Petroleum products are indispensable in the national defense program and we do not contemplate any serious curtailment of drilling operations," Mr. Walker said when stating that the company expected to show a substantial increase in business this year.

Net income for 1940 was $1,630,297 equal to $5.49 a share on the 5½ per cent preferred and $5.99 on the 6 per cent preferred, compared with net income of $1,190,787 in 1939.

BOMB SCOOTERS: To haul bombs from storage racks to planes, the government has ordered 600 bomb carriers (like that shown below) from the Weaver Mfg. Co., Springfield, Ill. The carrier is placed under a bomb in the storage rack and pressure on a pedal hoists the bomb clear, after which it is lowered into carrying position. At the plane a second push of the pedal pushes the bomb aboard. The carriers (with engineering assistance of Lincoln Electric Co., Cleveland) are being fabricated by arc welding.



Farm Machinery Value Drops in 1940

Washington

• • • **Implements and machinery** on farms of the United States declined to a value of $3,059,266,237 in 1940 from $3,301,654,481 in 1930; the average dollar value of the equipment per farm was slightly above $500 per farm last year, a reduction of more than $20 per farm; and the number of farms dropped to 6,096,789 from 6,288,648 a decade ago, according to the Bureau of Census.

In addition to topping the list of all states in the total value of all farm property — lands and buildings—the agricultural state of Iowa also topped the list in the average value of implements and machinery per farm. It showed more than double the national average.

Each of 12 states reported farm implements and machinery exceeding $100,000,000.

The following table shows the gross value of implements and machinery in these states, together with the average value per farm.

State	*Total value of implements and machinery*	*Average value, per farm, of implements and machinery*
Iowa	$242,047,158	$1,134.68
Minnesota	193,443,905	980.20
Illinois	186,681,869	874.63
Texas	180,744,212	432.40
Wisconsin	173,830,861	930.90
New York	138,341,935	902.79
California	132,339,109	997.58
Pennsylvania	129,099,593	763.78
Michigan	121,573,846	648.08
Ohio	120,211,863	514.20
Kansas	115,262,686	737.31
Indiana	106,511,659	577.15

Mesta Earnings $3,083,032

• • • **Mesta Machine Co.,** Pittsburgh, reports 1940 net earnings of $3,083,032, compared with $2,715,427 in 1939. Backlog at the close of 1940 was $22,954,048, against $10,797,740 a year earlier.

All Aluminum Ladder Co. Facilities Used in Defense

Pittsburgh

• • • **S. H. Carbis,** president, Aluminum Ladder Co., Tarentum, Pa., says that for the duration of the emergency its entire facilities for fabricating sheet metal aluminum will be devoted exclusively to the manufacture of items for national defense.

Three Generations of Wire Drawing Experience Offer You Round and Shaped Wire for Manufacturing Purposes

Steel Wire

Aircraft Wire
Armature Binding Wire
Bicycle Spoke Wire
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Bookbinder Wire
Bronze Plated Wire
Brush Wire
Car Seal Wire
Card Wire
Casing Wire
Curtain Spring Wire
Flat Wire
Flexible Shaft Wire
Fish Leader Wire
Hard Drawn Spring Wire
Half Round Wire
Hose Reinforcement Wire
Lock Spring Wire
Music Wire
Rope Wire
Scratch Brush Wire
Shaped Wire
Signal Corps Wire
Spoke Wire
Spring Wire
Tire Bead Wire
Tempered Wire
Valve Spring Wire

JOHNSON STEEL & WIRE CO., INC.

MAIN OFFICE AND PLANT • WORCESTER, MASSACHUSETTS

Branch Plants and Warehouses: AKRON, OHIO; LOS ANGELES, CALIF.

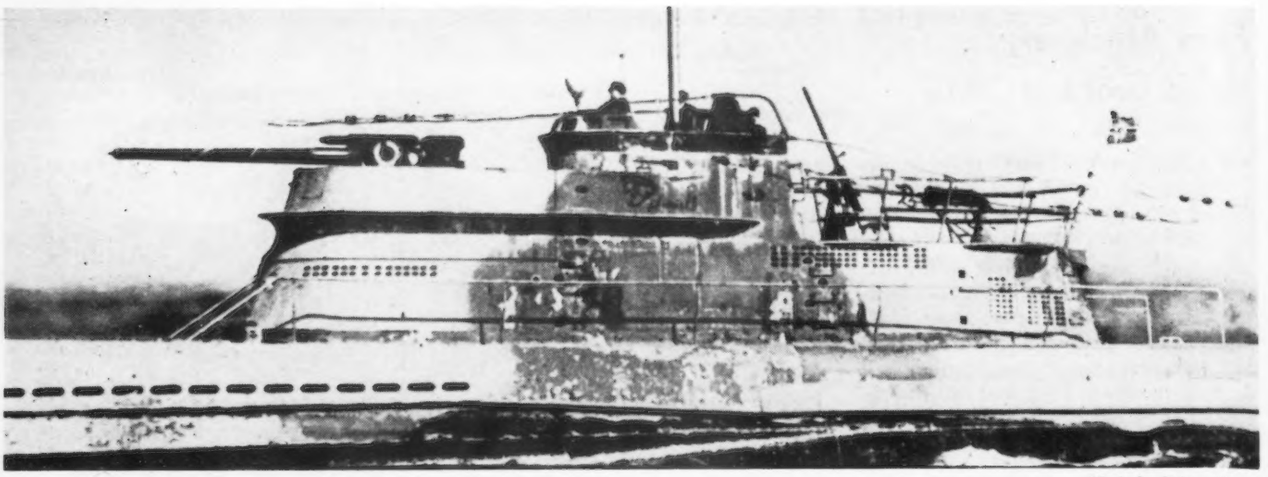


Photo by International

LONG-RANGE RAIDER: This photo of the superstructure of a giant German submarine was taken as it returned from a hunting expedition in the North Atlantic, according to the German caption. The craft has two anti-aircraft guns aft of the conning tower, plus the usual deck gun forward.

Galvanizers Still Take Non-Defense Orders

Pittsburgh

• • • **Although most hot dip** galvanizers are using much of their equipment for national defense orders, they are still in a position, for the time being at least, to fulfill commercial or non-defense contracts, it was indicated here last week at the annual meeting of the American Hot Dip Galvanizers Association.

The availability of zinc supplies in the future and possible government action, will determine how long non-defense or commercial business can be adequately handled.

Important feature of the meeting aside from two technical papers was a comprehensive report on the zinc situation by Stuart J. Swensson, secretary-treasurer of the association. He indicated that the present tight situation in zinc which has resulted in the allocation of available supplies and possibility of more stringent action later, was brought about by the following factors: Hoarding, increased demand, holding material for price advance, frenzied bidding, forward buying, and national defense requirements.

Mr. Swensson said that the Zinc Institute and the government were doing everything possible to alleviate the zinc situation and it was stated that smelting capacity was being expanded. At the present time Mr. Swensson said, almost 60,000 tons of zinc is being produced each month from domestic ores and from 5000 to 6000 tons a month from imported ores. The automobile industry which consumes approximately 12 per cent of the zinc output, he said, has released large quantities of the metal and plans are being rushed to find zinc substitutes.

The future action of the government cannot be foretold at this time, but it was indicated by the speaker that if no change in the current picture occurs, zinc might possibly follow the same course as aluminum where mandatory priorities have been invoked.

Many users of zinc are still getting supplies while others are finding it extremely difficult if not impossible to obtain them. Inventories on hand in many cases are sufficient to last only from two weeks' to two months' operations and the distribution of inventories does not appear to be well defined.

R. W. Sandelin, metallurgist, Atlantic Steel Co., Atlanta, Ga., reviewed for association members a comprehensive experiment on the "Influence of Base Metal on Hot Dip Galvanized Coatings." Studying the finish, the coherence, and the zinc coating weight through experimentation with 400 samples and 90 different types of steels, Mr. Sandelin found that phosphorous and silicon content of steel influenced the coatings quite extensively.

Copper, manganese, titanium and carbon did not seem to have much, if any, effect upon zinc coatings regardless of the amounts present in the base metal.

The entire experiment was closely controlled, all specimens being of the same size and one-quarter in. square. The variations in chemical content were made by making additions to the mold when the steel was being poured.

Experimentation showed that a silicon content in the base metal of 0.05 and up, resulted in a gray coating with good adherence. It was noted, however, that silicon content between 0.20 and 0.25 produced a slighter coating weight and poor adherence.

It was also found that an increasing amount of phosphorous

F. P. Auxer Elected By Hot Dip Galvanizers

Pittsburgh

• • • F. P. Auxer, National Telephone Supply Co., Cleveland, was elected president of the American Hot Dip Galvanizers Association; Phelps Ingersoll, Wilcox-Crittenden & Co., Inc., Middletown, Conn., was made first vice-president; Clem Stein, International-Stacey Co., Columbus, Ohio, was elected second vice-president; and Stuart J. Swensson, American Bank Bldg., Pittsburgh, was reelected secretary and treasurer.

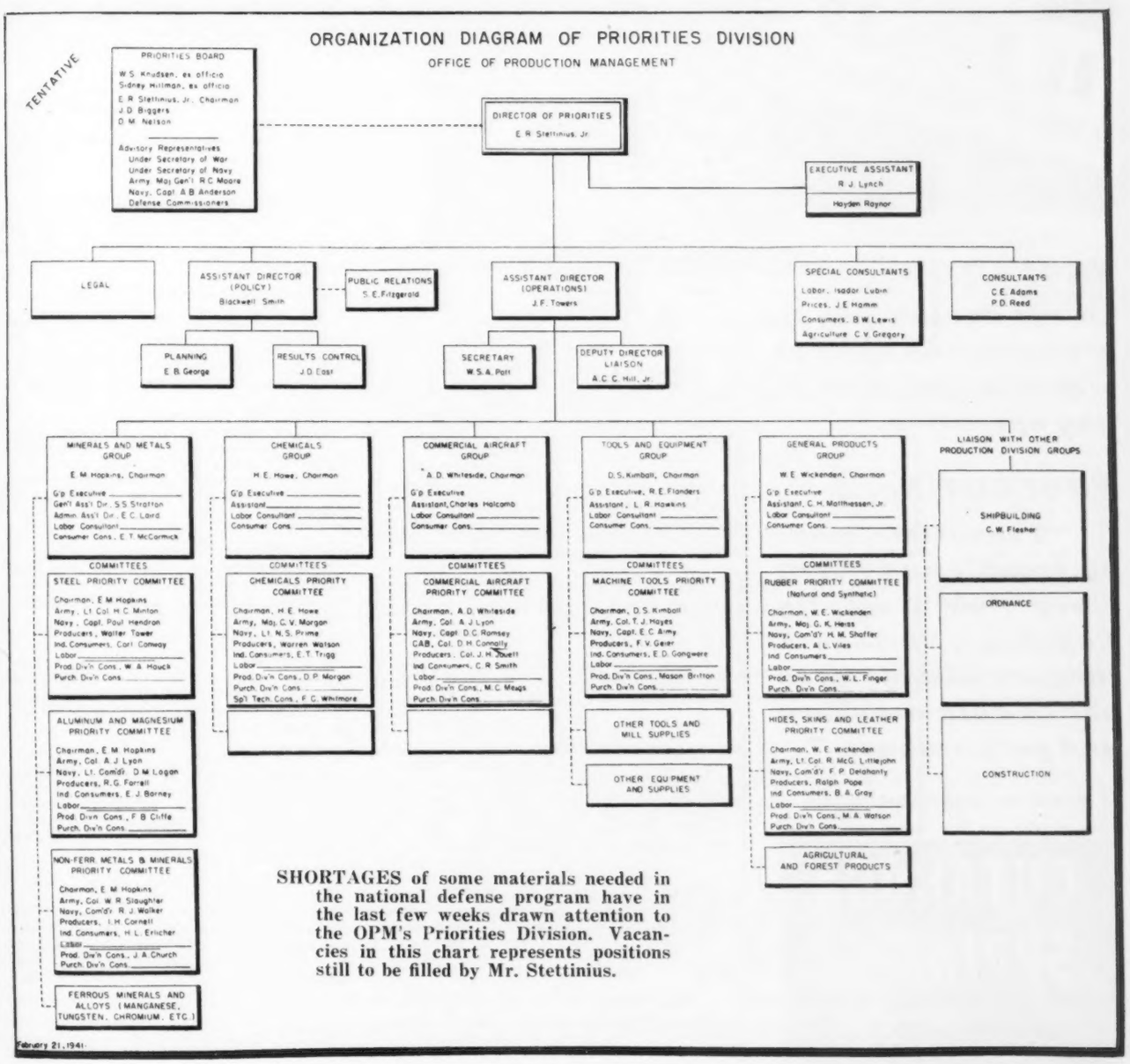
had a tremendous effect by increasing the coating weight and producing a gray coating as well as a brittle one. The addition of silicon, however, running from 0.05 and up, appeared to cut down the action of phosphorous. On samples where the phosphorous ran from 0.08, the zinc coating was quite heavy and brittle, and adhesion was poor. Although the immersion time for the samples was ½ a min., 1 min. and 3 min., certain tests were standardized at one-half a minute immersion.

R. J. Kepfer and L. D. Eubank of the E. I. du Pont de Nemours Co., discussed "The Reduction of Dross Formation in Hot Dip Galvanizing by the Use of Zinc Ammonium Chloride Pre-Dip." The authors stated that the amount of iron dissolved from the steel by the galvanizing bath in the experiment performed was about 60 per cent greater when using fresh muriatic acid pre-dip than when using a solution of zinc ammonium chloride. By converting the figures for iron dissolved, to dross formation, it was claimed an average dross saving of about 11 lb. per 500 sq. ft. of surface galvanized was obtained when using a zinc ammonium chloride pre-dip, or roughly, for each ton of zinc used for coating purposes, about 55 to 60 lb. more dross was formed when using a muriatic acid pre-dip as against the zinc ammonium chloride solution.

Tool Priorities Worry Training Schools

Gary, Ind.

• • • **Machine tool** priorities have defense training schools worried. The Gary schools, where 300 are enrolled and 200 are on the waiting list, have $61,000 in machine shop equipment requisitioned but have been unable to get priority ratings. Without the new equipment, the list of trainees cannot be increased. Hammond, Ind., schools, however, have gained approval for orders amounting to $79,000. About 19 machines have been obtained, new and used, which will permit the schools taking on 150 more students making 600 in all.



SHORTAGES of some materials needed in the national defense program have in the last few weeks drawn attention to the OPM's Priorities Division. Vacancies in this chart represents positions still to be filled by Mr. Stettinius.

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"It doesn't pay to economize on springs—they are so vital to any operation."

THOUGHT No. 2:—

"I save time, money, trouble and worry every time I specify Cuyahoga Springs . . they are always up to par in both accuracy and performance."

Send us your inquiries

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10280 BEREA ROAD
CLEVELAND, OHIO

Trade Notes

Okonite Co., Passaic, N. J., manufacturer of insulated wires, cables and splicing tapes, has opened a new district office at 1212 Comer Building, Birmingham, Ala. The St. Louis office was moved to larger quarters at 1406 Shell Building.

•

Ampco Metals, Inc., Milwaukee, to take care of its expanding business, is increasing facilities by adding a new foundry to its plant. Cost of the new 76,000 sq. ft. of working space will be $140,000.

•

Nelson Galvanizing & Tinning Works, Inc., has moved to 39-16 23rd Street, Long Island City, N. Y.

•

Sale of the Carrier Corp., former plant in New Brunswick, N. J., to the Harris-Hub Bed & Spring Co., Chicago, one of the Midwest's largest steel furniture manufacturers, has just been announced by J. I. Lyle, president of Carrier Corp., Syracuse, N. Y., air conditioning equipment manufacturers and engineers.

•

W. R. Swoish, sales manager of the Roller-Smith Co., Bethlehem, Pa., announces appointment of the John W. Clarke Co. as the Roller-Smith representative for the Chicago territory, comprising the northern half of Illinois, northern Indiana, Wisconsin and eastern Iowa.

•

P. B. McBride, president, announces the opening of a Washington office of the Porcelain Enamel Institute in the Chandler Building. Thomas B. Collins has been made Washington representative.

•

Westinghouse Electric & Mfg. Co. announces that it is now operating as its X-ray division the former Westinghouse X-Ray Co., Long Island City, N. Y.

•

Exact Weight Scale Co., 944 West Fifth Avenue, Columbus, Ohio, has taken a lease on the one-story brick building adjacent to its property on the west at 964 West Fifth Avenue, which is to be used for storage purposes. The City Ice & Fuel Co. owns the building. Lease negotiations were made through the offices of Wm. P. Zinn & Co., realtors.

•

Gairing Tool Co., 21221 Hoover Road, Detroit, has moved into a new, enlarged plant at that address.

•

A pamphlet, "Tolerances for Cylindrical Fits," by John Gaillard, mechanical engineer on the staff of the American Standards Association, has just been published by the latter organization and is available from its headquarters, 29 West 39th Street, New York, at 25c. a copy.

•

George Scherr Co., Inc., 128 Lafayette Street, New York, announces its appointment as exclusive sales distributer, both domestic and foreign, for the Wilder Micro-Projector manufactured by R. S. Wilder, Inc., Waltham, Mass.

•

The DeVilbiss Co., Toledo, Ohio, makers of paint spray equipment, has leased 50,000 sq. ft. of space in the nearby former Bock Bearing plant and staffed it with 150 employees to manufacture air compressor units for the army. The units weigh about 400 lb. and are used to operate tools, spray paint and for other power applications in the field.

•

A new Thor building in Philadelphia at the corner of 17th Street and Fairmount Avenue by March 31 will become headquarters for the Philadelphia branch of the Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Illinois, manufacturers of Thor Portable Power Tools.

•

Thomas S. Gassner Co. has opened up a new department, in addition to its present sheet metal specialty work, consisting of the fabrication of stainless and aluminum aircraft small parts such as ammunition boxes, ammunition chutes, bomb racks and allied parts. It is building an extension to the plant to increase production.

•

Abbott Tool & Die Co. has been organized in Milwaukee by Albert W. Graff, Gustave S. Krantz and Edward J. Grote for experimenting in and development of tool and die making machinery and similar products.

•

Stampings, Inc., 536 W. Wisconsin Avenue, Milwaukee, to deal in and manufacture pressed steel products, has been organized by Valentine W. Danielson, William C. Burkard and Clare T. Stelzl.

•

After leasing for four years the Wilson Avenue plant formerly occupied by Sharon Steel Corp., Cold Metal Process Co. has exercised an option and purchased the property for around $125,000.

•

Stanton Steel Co., 24647 Sherwood Road, Center Line, Mich., sheet steel jobber, has awarded contract to Campbell Construction Company, 3255 Goldner Avenue, Detroit, for one-story addition, 50 x 140 ft. Cost close to $20,000.

•

W. F. Detwiler, chairman of the board of Allegheny Ludlum Steel Corp., announces completion and opening of the company's new, modern warehouse and offices at 4915 Pacific Boulevard, Los Angeles.

•

Glyco Products Co., Inc., has moved its offices, plant and laboratories from 148 Lafayette Street, New York, to larger quarters in Brooklyn.

•

G & N Mfg. Co., 11610 Madison Avenue, Cleveland, maker of the G & N high-pressure hydraulic diecasting machine, has opened a new machining and assembly plant in Bucyrus, Ohio.

•

McNally Pittsburgh Mfg. Corp., Pittsburg, Kan., has acquired all patents and manufacturing rights formerly owned by Koppers-Rheolavens Co., Pittsburgh, Pa. McNally Pittsburgh manufactures coal preparation and material handling equipment.

•

Kester Solder Co., main plant and general offices in Chicago, announces the purchase of the property now occupied by its Newark, N. J., division located at Ferguson and Clover Streets in Newark. F. C. Engelhart is president.

•

Lewis & Erickson, manufacturers of Erickson arc welders, announce their removal to 1228 Broadway Court, Rockford, Ill.

Gary Steel Workers Will Be Fingerprinted

Gary, Ind.

• • • Fingerprinting of employees of Gary steel works of the Carnegie-Illinois Steel Corp. will be undertaken shortly. Prints of all old and new employees, mill and office alike, will be taken as part of a growing movement in the country toward this method as a means of identification. At the same time, identification badges bearing each employee's photograph and payroll number will be issued.

Pilot Plant For Coast Manganese Ore Treatment

Pullman, Wash.

• • • **Preliminary plans are** under way for construction at Washington State College of a pilot plant for recovery of manganese metal from the high-silical ores of the Olympic peninsula, according to A. E. Drucker, dean of the school of mines at the College.

The school of mines is developing a process for leaching these manganese ores, so that high-purity manganese metal may be recovered by electric deposition. A pilot plant for the extraction of magnesium from Stevens County magnesite has already been built and will soon be in operation.

Canada Names Priorities Head

Ottawa

• • • **Appointment of** R. C. Berkinshaw, manager, Goodyear Tire & Rubber Co. of Canada, as director general of the priorities branch of the Department of Munitions and Supply has been announced by C. D. Howe, Supplies Minister.

Laclede Profit $273,484

• • • **Net profits for** 1940 of the Laclede Steel Co., St. Louis, amounted to $273,484, equal to $1.33 per share of $20 par stock, compared to $210,053, equal to $1.02 per share in 1939.

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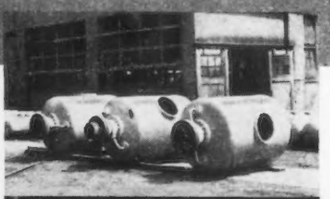

Cereal Cookers fabricated from IngAclad by Leader Iron Works, Inc., Decatur, Ill.

Tanks fabricated of IngAclad Plate by Leader Iron Works, Inc., Decatur, Ill., for Wilson Laboratories Division of Wilson & Co.

These Tanks for storage of Extracts were fabricated of IngAclad by Sheet Metal Engineering Co., Chicago, Ill.

It will pay you to investigate the economies of IngAclad Stainless-Clad Steel. A deep uniform cladding of finest quality stainless gives perfect protection on the contact side of the Sheet or Plate. Naturally, the cost per pound of IngAclad is much lower than that of solid stainless, making possible large savings in material costs and lower bids on the prospective job. Ask your fabricator to quote on IngAclad . . . the one stainless-clad metal with a 10-year record.

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Unretouched photo of machine-cutting. Note the inseparable bond.

INGACLAD
STAINLESS-CLAD STEEL

Rise in Steel Wages Seen at Pittsburgh

By T. C. Campbell

Pittsburgh

• • • **First definite indications** that prevailing wage rates in the steel industry will be revised came last week in a letter from the SWOC summoning all local union officers from plants of the United States Steel Corp. to a meeting here, March 7, to discuss problems incident to the negotiating of a new wage agreement with United States Steel Corp. and also to decide upon our policy in respect thereto.

The summoning of approximately 150 SWOC officials to the William Penn hotel this week is taken as an indication that the extended informal discussions between Philip Murray and U. S. Steel Corp. officials which started last fall, are soon to reach an end.

Matters moved at a rapid pace last week when Mr. Murray and other union officials conferred twice with Benjamin F. Fairless, president, U. S. Steel Corp., and William Beye, vice-president. It is also significant that the presidents of the various U. S. Steel subsidiaries were in conference here last Thursday and Friday, both of these days coinciding with Mr. Murray's visits.

The possibility that Murray and the Steel corporation have reached a stalemate is not entertained here by informed sources. On the contrary it is believed that an offer has been made which, if accepted, would result in an upward wage adjustment and the calling together of SWOC officials is taken as an indication that they will take part of the responsibility for accepting an agreement, even though the executive committee of the SWOC has full power to negotiate.

While various reports have mentioned a 10 per cent increase, it is doubtful if this figure has been seriously entertained during informal negotiations. Such an increase might warrant an adjustment in steel prices, chances for which would be remote in view of the attitude in Washington on this matter. Concensus here is that a

wage increase would be more in the nature of an adjustment because of the amount involved, which might run from 4 to 6 per cent if an agreement is finally reached in formal conferences.

The last major contractual negotiations occurred early in 1937 when the $5 a day base labor rate was established in major steel centers of the U. S. Steel Corp. Any action taken by U. S. Steel at this time as a result of union negotiations will affect the entire steel industry and key steel consuming and supplying industries. It is believed that OPM officials have been advised on the progress of informal wage discussions.

The establishment of a smoother grievance machinery setup and the liberalization of vacation allowances are believed to be a foregone conclusion here. Negotiations of contract changes with Jones & Laughlin Steel Corp. and Crucible Steel Co. of America are expected to follow when and if U. S. Steel negotiations are completed.

13 Processing Plants Produce Bauxite

Washington

• • • **Mines and processing** plants in the United States producing bauxite had a total output in 1939 valued at $2,528,264, about 13 per cent higher than in 1929, according to preliminary figures released by Dr. Vergil D. Reed, Acting Director of the Census. These mines and plants produced 232,398 long tons of dried ore, 58,521 long tons of calcined and sintered ore, 8753 long tons of activated ore, and 58,119 tons of crude ore mined but not processed during the year. The total quantity of bauxite, converted to dried-bauxite equivalent, amounted to approximately 390,000 long tons. Bauxite is the ore from which aluminum is derived.

Eleven companies operated the 14 mines and 13 processing plants producing bauxite in 1939. Nine of the mines, located in Pulaski and Saline Counties, Arkansas, accounted for 97 per cent of the 451,000 long tons of crude bauxite mined. The remainder was produced at four mines in Barbour and Henry Counties, Alabama, and one mine in Sumter County, Georgia.

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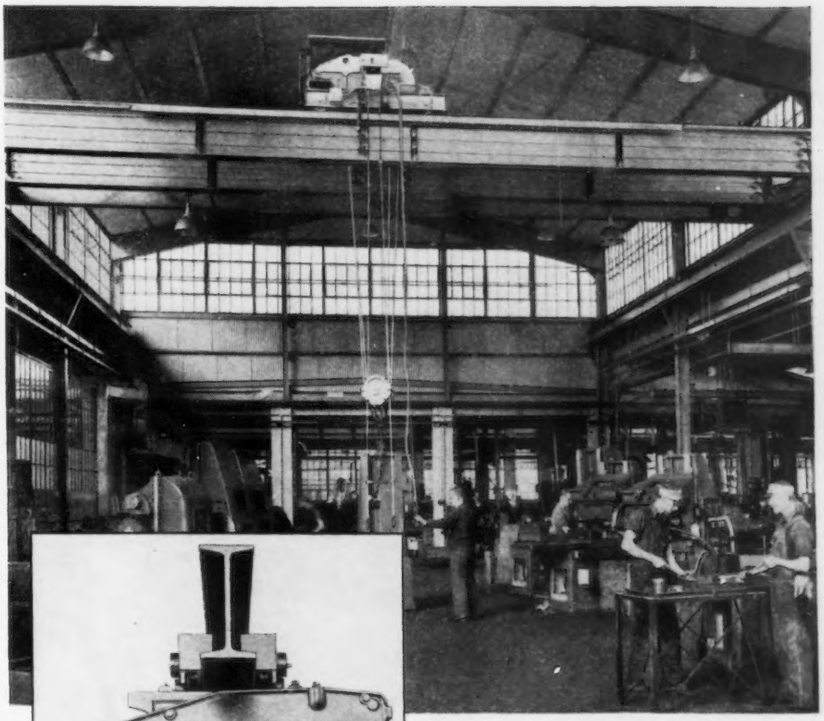

↑ 10-ton capacity, 45-foot span, 3-motor R & M crane with two-speed, pendant, push-button controlled R & M hoist handling heavy castings in a leading machine tool assembly plant.

← New Type I-Beam R & M electric hoist of all-steel construction, with built-in steel trolley and safety lug, providing a line of steel from track to hook. Electrical equipment enclosed.

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It's a wise plant engineer who, faced with conditions like these, suggests "taking it up" with R & M.

In case after case, industries planning expansion, shops needing a step-up of present facilities, have found the most *profitable* answer in service-tested R & M hoists and cranes.

R & M's 2,000 models provide a standard hoist or crane to meet practically any type of material-handling problem. If none of these fits *your* set-up, a special job that does is tailored to order for you.

A brief session with an R & M expert may mean a saving of thousands of dollars. Call your nearest Robbins & Myers office now. Or write the factory direct today explaining your problem.

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Government Awards

Government awards during the week ended Feb. 22, 1941, as listed by the Public Contracts Division, Department of Labor, follow:

Iron and Steel Products...$18,059,170

Aluminum & Brass Co., Lockport, N. Y.; cylinders $13,500
American Forge Div., American Brake Shoe & Foundry Co., Chicago; forgings 111,600
W. R. Ames Co., San Francisco; ammunition boxes 20,112
Albert & J. M. Anderson Mfg. Co., Boston; cartridge cases 1,623,930
Apollo Steel Co., Apollo, Pa.; sheet steel 94,398
Armstrong Brothers Tool Co., Chicago; socket wrenches 167,485
Atlas-Ansonia Co., New Haven, Conn.; fuze parts 484,000
Bethlehem Steel Co., San Francisco; wire rope 46,212
Bethlehem Steel Export Corp., New York; fabricated steel work 107,018
fabricated steel plates 3,592,966
Bridgeport Thermostat Co., Inc., Bridgeport, Conn.; bomb, bodies and fins 217,728
Carnegie-Illinois Steel Corp., Washington; sheet steel 297,790
steel 27,192
Columbia Steel Co., San Francisco; reinforcement bars 24,385
wire rope 11,328
Columbian Steel Tank Co., Kansas City; storage tanks 56,694
Crane Co., Long Island City, N. Y.; valves 21,163
Peter A. Frasse & Co., Inc., New York; steel tubes 15,410
Globe Machine & Stamping Co., Cleveland; cartridge cases 491,000
Globe-Wernicke Co., Cincinnati; partitions 10,547
Greene-Wolf Co., Inc., Brooklyn; unions 14,934
C. Hager & Sons Hinge Mfg. Co., St. Louis; hinge hasps 22,692
Hard Mfg. Co., Buffalo; metal litters 23,628
Heintz Mfg. Co., Philadelphia; doors, scuttles 894,374
Hoover Co., North Canton, Ohio; fuze parts 3,923,300
Kutztown Foundry & Machine Corp., Kutztown, Pa.; bed plates 15,764
A. Leschen & Sons Rope Co., San Francisco; wire rope 39,243
Maclane Hardware Co., New York; tools 84,115
Milwaukee Stamping Co., Milwaukee; canister bodies 43,475
Norris Stamping & Mfg. Co., Los Angeles; cartridge cases 2,664,000
Ohio Galvanizing & Mfg. Co., Niles, Ohio; trailer trucks 24,980
Oliver Iron & Steel Corp., Pittsburgh; bolts 23,384
Omaha Steel Works, Omaha, Neb.; steel for bridge 12,581
Parker Appliance Co., Cleveland; coupling 12,776
Plomb Tool Co., Los Angeles; socket wrenches 81,330
Risdon Mfg. Co., Naugatuck, Conn.; grommets 67,296
Slaymaker Lock Co., Washington; bolts 15,048
Spetnagel Hardware Co., Chillicothe, Ohio; cotter pins 13,274
Struthers Wells-Titusville Corp., Titusville, Pa.; forgings 172,152
Taylor Wharton Iron & Steel Co., New York; steel cylinders 101,292
Veit & Young, Philadelphia; blanks 13,226
Weatherhead Co., Cleveland; fuze parts 1,032,000
S. Weinstein Supply Co., New York; chisels 10,341
Westergard Boat Works, Inc., Rockport, Tex.; hulls and fittings 240,628
Westinghouse Elec. & Mfg. Co., Springfield, Mass.; fuze parts.. 944,000
F. C. Williams, Inc., Dearborn, Mich.; heating units 59,098
York Safe & Lock Co., York, Pa.; brake assy. rings 13,894
Youngstown Sheet & Tube Co., Youngstown, Ohio; bar round steel 61,966

Nonferrous Metals & Alloys...$4,175,240

Aluminum Co. of America, Pittsburgh; alloy aluminum $20,820
conductor and accessories 30,994
American Brass Co., Waterbury, Conn.; brass 11,894
Bridgeport Brass Co., Bridgeport, Conn.; cartridge cases 2,664,240
Chase Brass & Copper Co., Inc., Waterbury, Conn.; cartridge cases 816,340
brass rods 22,367
brass 13,574
Chelsea Clock Co., Chelsea, Mass.; clocks 66,030
Columbian Bronze Corp., Freeport, N. Y.; bronze castings 12,250
Doehler Die Casting Co., Pottstown, Pa.; nozzles 42,126
booster cups 20,860

Circle — Dings Pulley Type Separator at Federated Metals. Above—Type D.A. Separator for borings and turnings.

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OPERATIONS at the modern Whiting, Indiana, plant of the Federated Metals Division, American Smelting and Refining Co. depend on the positive, automatic, fast economical removal of all pieces of iron from non-ferrous scrap. Federated relies 100% on Dings *High Intensity* Magnetic Separators for this job and gets year after year of perfect results and complete satisfaction.

Regular run of scrap is passed over a Pulley Type Separator—borings and turnings are run over a Dings Type D.A. Separator—every bit of iron is removed automatically!

If you have a similar problem, consult *Magnetic Headquarters* — there's a separator for every job—even one with vibrating trays for mechanically entangled scrap. DINGS MAGNETIC SEPARATOR CO., 727 Smith St., Milwaukee, Wis. *World's Largest Exclusive Builders of Magnetic Equipment.*

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CATALOG 250 describes Dings Pulleys—a valuable guide. Send for it and literature on other separators for every job.

Dings MAGNETIC SEPARATION HIGH INTENSITY

General Fire Truck Corp., Detroit; fire extinguishers 10,470
Hamilton Watch Co., Lancaster, Pa.; watches 38,832
Harvey Metal Corp., Chicago; brass forgings 63,063
forgings 10,551
International Silver Co., New York; silver-plated ware 110,368
Phelps Dodge Copper Prod. Corp., British American Tube Div., New York; brass pipe 41,715
Rembrandt Lamp Corp., Chicago; bridge lamps 18,380
Revere Copper & Brass Co., Inc., Baltimore Division, Baltimore; cartridge, brass 47,500
Scovill Mfg. Co., Waterbury, Conn.; condenser tubes 12,771
William Scrimgeour, Washington; forks 70,880
R. Wallace & Sons Mfg. Co., Wallingford, Conn.; silver-plated ware 110,368

Other Machinery $18,266,299

Allith-Prouty, Inc., Danville, Ill.; stand assemblies 888,750
American Hoist & Derrick Co., St. Paul, Minn.; winches 32,207
Babcock Printing Press Corp., New London, Conn.; machining forgings 607,500
Bay City Shovels, Inc., Bay City, Mich.; crane truck 14,400
G. S. Blakeslee & Co., Chicago; potato peelers 14,361
Bradford Machine Tool Co., Cincinnati; lathes 241,735
Brown & Sharpe Mfg. Co., Providence; milling machines 16,469
Cincinnati Milling Machine & Cincinnati Grinders, Inc., Cincinnati; milling machines 21,720
Colt's Patent Fire Arms Mfg. Co., Hartford; dishwashers 68,770
Copeland Refrigeration Corp., Sidney, Ohio; refrigerators 25,306
Davenport Besler Corp., Davenport, Iowa; locomotive 125,250
DeLaval Separator Co., New York; oil purifying units 10,745
DeLaval Steam Turbine Co., Trenton, N. J.; pumps 1,350,000
Dutton-Lainson Co., Hastings, Neb.; shell 206,323
Easton Car & Construction Co., Easton, Pa.; electric trucks ... 11,125
Ellicott Machine Corp., Baltimore; dredge 1,525,500
Farnham Mfg. Co., Buffalo; forming roll machines 10,326
Fate-Root-Heath Co., Plymouth, Ohio; locomotive 125,250
Gammons-Holman Co., Manchester, Conn.; reamers 11,124
General Electric Co., Washington; locomotive 26,090
General Machine Co., Newark, N. J.; blenders 44,974
General Motors Corp., Cleveland Diesel Engine Division, New York; generator engine parts.. 12,806
C. H. Gosiger Machine Co., Dayton, Ohio; lathes 240,109
Greenfield Tap & Die Corp., Greenfield, Mass.; gages 51,557
Hobart Mfg. Co., Troy, Ohio; dishwashers 22,783
Hussmann-Ligonier Co., St. Louis; refrigerators 31,205
Imperial Machine & Foundry Corp., Lindenhurst, N. Y.; potato peelers 13,750
Independent Engineering Co., Inc., O'Fallon, Ill.; portable helium purification laboratories 124,840
Jacobson & Co., Inc., New York; engine test equipment 48,847
E. A. Kinsey Co., Indianapolis; grinders 15,214
Lakeside Bridge & Steel Co., Milwaukee; cranes 172,560
Lees-Bradner Co., Cleveland; milling machine 39,458
Linn Mfg. Corp., Morris, N. Y.; tractor trucks 26,155
Liquid Carbonic Corp., New York; soda fountains with carbonator, compressor, etc. 73,417
Lodge & Shipley Machine Tool Co., Cincinnati; lathes 32,648
Oscar Lucks Co., Seattle; bakery machines 27,155
McKiernan-Terry Corp., Harrison, N. J.; boat crane 109,600
F. S. McLachlan Co., Inc., New York; exhaust system 31,430
Manning, Maxwell & Moore, Inc., Bridgeport; gage assemblies ... 459,185
Miller-Dunn Co., Miami, Fla.; diving apparatus 34,260
Modern Tool & Die Co., Philadelphia; gages 64,360
Monarch Machine Tool Co., Sidney, Ohio; lathes 59,916
Montgomery Elevator Co., Moline, Ill.; elevators 12,894
Osgood Co., Marion, Ohio; crane 20,500
Pollak Mfg. Co., Arlington, N. J.; bomb racks 65,000
H. K. Porter Co., Inc., Pittsburgh; locomotives 282,000
Price Brothers, Inc., Frederick, Md.; antenna 12,116
Pullman Standard Car Mfg. Co., Butler, Pa.; machining shell .. 1,590,000

100% GREATER PRODUCTION
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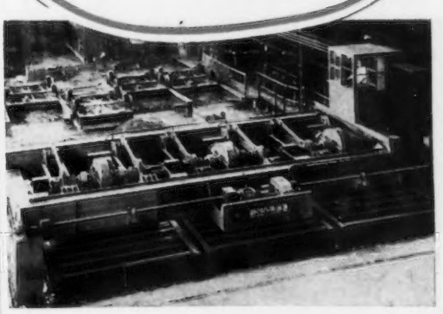
The AMCO PIT FURNACE



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IA69

Read Machinery Co., Inc., York, Pa.; mixers	20,925
Sealed Power Corp., Muskegon, Mich.; diesel engine parts	30,831
Sidney Machine Tool Co., Sidney, Ohio; lathes	52,533
Silent Hoist Winch & Crane Co., Brooklyn; cranes	13,935
Smith-Courtney Co., Richmond, Va.; lathe	11,372
John E. Smith's Sons Co., Buffalo; food cutters	15,975
Stewart-Warner Corp., Chicago; diesel engine parts	57,523
Nathan Straus-Duparquet, Inc., New York; refrigerators	24,280
B. F. Sturtevant Co., Boston; blower	31,225
Talon, Inc., Meadville, Pa.; gages	27,544
Vandyck Churchill Co., New York; boring mill	24,835
Walker Mfg. Co. of Wisconsin, Racine, Wis.; jacks	12,284
Warren Steam Pump Co., Inc., Warren, Mass.; pumps	708,328
Willys-Overland Motors, Inc., Toledo, Ohio; shell	8,862,040
Worthington Pump & Machinery Corp., Harrison, N. J.; pumps	13,888

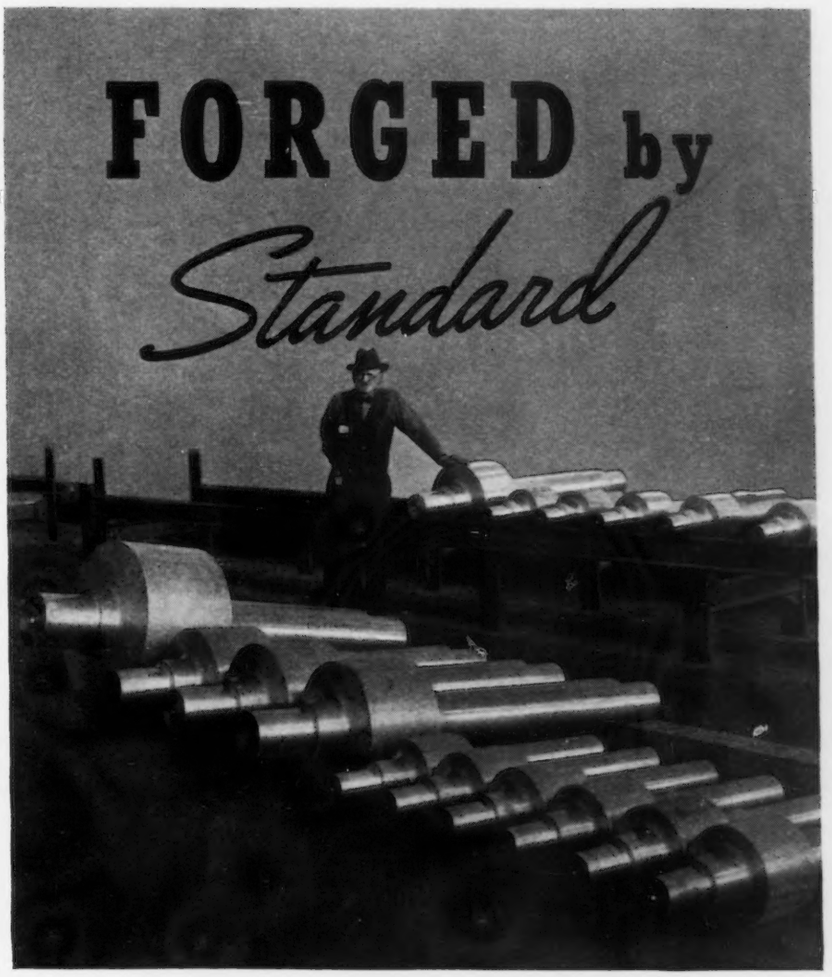
Navy Dept., Bureau of Supplies and Accounts:

Acromark Corp., Elizabeth, N. J.; presses, tag, power	86,236
Aluminum Co. of America, Washington; aluminum alloy	22,509
American Chain & Cable Co., Inc., York, Pa.; shackles	49,840
Amthor Testing Instrument Co., Inc., Brooklyn; tachometers, portable	8,137
Babcock & Wilcox Co., Barberton, Ohio; headers, back and front, intermediate	5,004
Bethlehem Steel Co., Bethlehem, Pa.; steel, bars	11,658
Bowen Products Corp., Auburn, N. Y.; cups, grease and oil	8,604
Chase Brass & Copper Co., Inc., Waterbury, Conn.; tubing, copper	12,388
Clyde Iron Works, Duluth, Minn.; winches, steam	32,630
Collyer Insulated Wire Co., Pawtucket, R. I.; cable, electric	64,026
Consolidated Machine Tool Co., Rochester; planer, double housing	113,685
Crane Co., Washington; valves, gate, steel	30,624
valves, composition	44,540
Crescent Ins. Wire & Cable Co., Trenton, N. J.; cable, electric	99,148
Crucible Steel Co. of America, New York; steel, C-R	35,748
Curtiss-Wright Corp., Curtiss Propeller Div., Caldwell, N. J.; blades, propeller	17,000
Earle Gear & Machine Co., Philadelphia; set of racks and pinions	53,520
Federal Motor Truck Co., Detroit; trucks, motor	47,003
William A. Force & Co., Inc., Brooklyn; machines, numbering	8,250
General Electric Co., Schenectady; cable, electric	34,652
General Motors Corp., Cleveland Diesel Engine Div., Cleveland; generator sets, diesel engine	152,427
Gisholt Machine Co., Madison, Wis.; lathes, turret	62,055
Herring Hall Marvin Safe Co., Hamilton, Ohio; safes	5,674
Highway Trailer Co., Edgerton, Wis.; trailers, four-wheel	34,172
Hydraulic Press Mfg. Co., Mt. Gilead, Ohio; presses, phenolic molding	24,070
machine, forging	26,499
Ingersoll-Rand Co., Washington; compressors, air	380,771
Insinger Machine Co., Philadelphia; machines, washing	11,360
International Nickel Co., Inc., New York; nickel-chromium-alloy	107,060
nickel-copper-alloy	1,473,090

Kingsbury Machine Works, Inc., Frankford, Philadelphia; thrust bearing shoes for turbines 10,887
Leland-Gifford Co., Worcester, Mass.; machines, drilling 7,300
Lloyd & Arms, Inc., Philadelphia; machines, piston ring, motor-driven 14,756
Lewin Mathes Co., E. St. Louis, Ill.; tubing, copper 18,857
Market Forge Co., Everett, Mass.; trucks, two wheel, and stands.. 38,370
Metalite Mfg. Co., Los Angeles; scoops, coffee or sugar 15,552
Morse Diving Equipment Co., Inc., Boston; pumps, air, diving apparatus 17,657
Okonite Co., Passaic, N. J.; cable, electric 9,265
Oliver Iron & Steel Corp., Pittsburgh; nuts, regular, steel ... 32,956
bolts and nuts, steel 119,330
Oliver Machy. Corp., New York; sanders, endless 24,730
Packard Motor Car Co., Detroit; motor, marine, spare parts 15,823
Pittsburgh Screw & Bolt Corp., Pittsburgh; bolts, steel 22,000
Pump Engineering Service Corp., Cleveland; pumps, fuel, engine-driven 88,971
John Reiner & Co., Inc., Long Island City, N. Y.; generator sets, diesel engine 280,286
Reo Motors, Inc., Lansing, Mich.; trucks, motor 32,936
Republic Steel Corp., Bolt & Nut Div., Cleveland; nuts, regular, steel 128,418
Revere Copper & Brass, Inc., Baltimore Div., Baltimore; tubing, copper 23,081
John A. Roebling's Sons Co., Trenton, N. J.; rope, wire and strand, seizing 19,425
E. J. Rooksby & Co., Philadelphia; bars, boring, portable 28,865
Savory, Inc., Newark; tin pie plates, steel frying pans 26,400
William Scrimgeour, Washington; machines, meat chopping 9,933
Sperry Gyroscope Co., Inc., Brooklyn; equipment, vibration measuring 9,170
Tannewitz Works, Grand Rapids, Mich.; saws, band, heavy duty. 16,336
S. G. Taylor Chain Co., Hammond, Ind.; chains and fittings 17,072
Taylor-Parker Co., Inc., Norfolk, Va.; cutters and saws, milling machine 28,226
United Aircraft Corp., Hamilton Standard Prop. Div., E. Hartford; blades, propeller 20,850
Virginia Machinery & Well Co., Inc., Richmond; valves, composition 16,522
P. Wall Mfg. Supply Co., Pittsburgh; bombs, practice and bands, suspension 286,960
Walworth Co., New York; valves, composition 11,186
E. J. Willis Co., New York; pumps, bilge 24,500
Wire Rope Corp. of America, Inc., New Haven, Conn.; rope, wire, steel 87,323

War Dept., Ordnance:

Allegheny Ludlum Steel Corp., Watervliet, N. Y.; rods, steel .. $225,595
American Awning & Canvas Co., Springfield, Mass.; containers .. 2,616
American Brass Co., Waterbury, Conn.; aluminum bronze 2,235
American Emery Wheel Works, Providence, R. I.; wheels, grinding 1,136
American Locomotive Co., Schenectady; springs 5,321
Ames Baldwin Wyoming Co., Parkersburg, W. Va.; shovels 1,797
Ampco Metal, Inc., Milwaukee; castings, bronze 5,239
tools and dies 2,979
Apex Tool & Cutter Co., Inc., Shelton, Conn.; tools 1,988



For more than half a century STANDARD has been meeting the requirements of industry for high quality, unusual shape, and close tolerances in forged steel parts.

The steel used is acid open hearth produced in Standard's furnaces under the close metallurgical control of a trained engineering staff.

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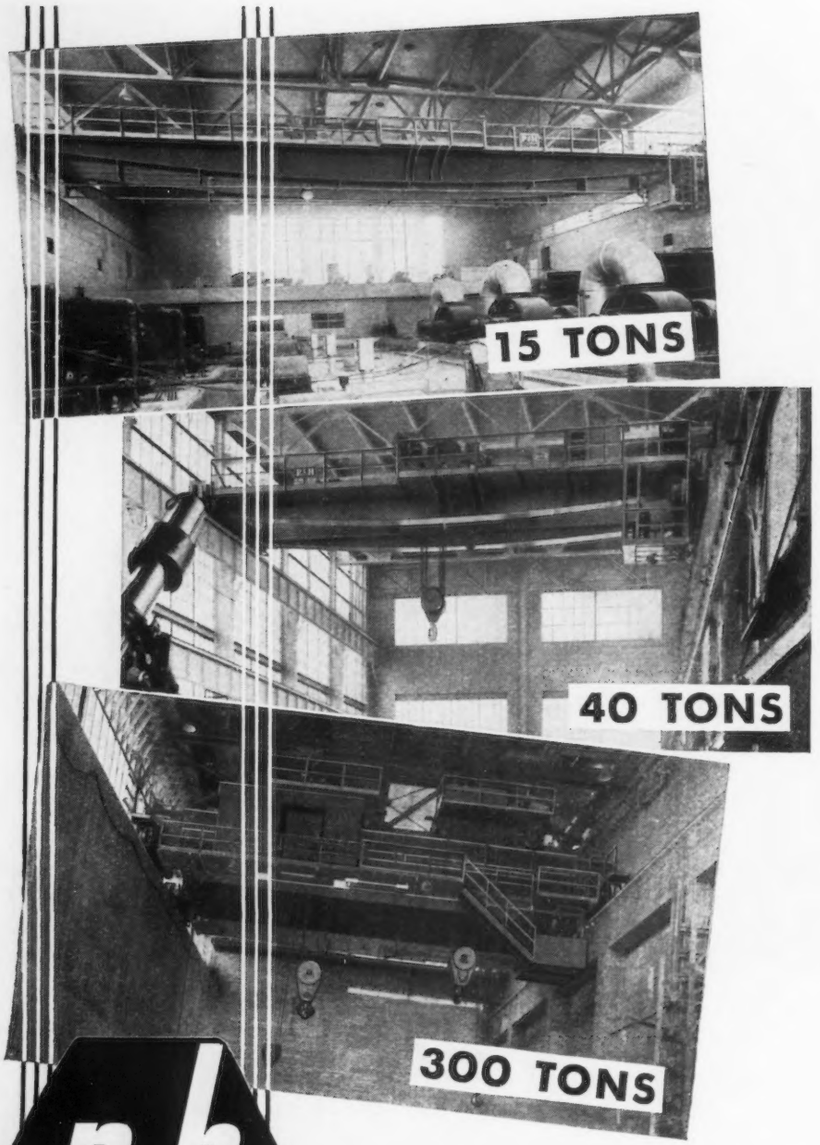

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Whatever your requirements in crane equipment, P&H can answer them with modern designs that assure you of efficient, economical service. Faster operating speeds and easier control enable you to meet the demands of today's increased production schedules.

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ELECTRIC CRANES • EXCAVATORS • ARC WELDERS P&H HOISTS • WELDING ELECTRODES • MOTORS

Associated Spring Corp., Wallace Barnes Co. Div., Bristol, Conn.; springs 5,663
Atlas Press Co., Kalamazoo, Mich.: shapers 6,600
Barber Colman Co., Rockford, Ill.: cutters 1,518
Barwood & Co., Philadelphia; inspection gages 5,272
Bay State Abrasive Products Co., Westboro, Mass.; wheels, grinding 2,357
Bayer & McConihe Lumber Co., Troy, N. Y.; lumber 1,950
Belknap Hardware Co., Inc., Louisville, Ky.; crowbars 2,938
Bendix Aviation Corp., Marine Division, Brooklyn; repeaters .. 4,125
Bethlehem Steel Co., Bethlehem, Pa.; steel 11,214
steel nuts 4,074
Benson Co., Inc., Cleveland; reamers 1,925
Black & Decker Mfg. Co., Towson, Md.; saws and grinders 4,190
E. W. Bliss Co., Brooklyn; presses, draw 23,362
Bonney Forge & Tool Works, Allentown, Pa.; tools 1,019
Bridesburg Engineering Co., Philadelphia; tools 2,746
Brown & Sharpe Mfg. Co., Providence; lathes 45,628
attachments, milling machine .. 1,092
gages, thread 1,239
Cape Ann Tool Co., Pigeon Cove, Mass.; forgings, steel 6,112
Carboloy Co., Inc., Philadelphia; tools 2,520
Carborundum Co., Chicago; wheels, grinding 1,745
Carpenter Steel Co., Reading, Pa.: rods, steel 226,874
Central Steel & Wire Co., Chicago; steel 1,051
Cincinnati Electrical Tool Co., Cincinnati; drills, electric 4,030
Colonial Broach Co., Detroit: broach sections 4,539
Colt's Patent Fire Arms Mfg. Co., Hartford; small arms materiel. 1,413
Arthur Colton Co., Detroit; machines, tablet 120,617
Dana Tool-D Nast Machinery Co., Philadelphia; drills 12,923
Daniels, C. R., Inc., New York; metallic belt links 10,976
tool rolls 22,516
Delta Mfg. Co., Milwaukee; press 1,900
Denison Engineering Co., Columbus, Ohio; equipment, conveying 26,490
A. P. DeSanno & Sons, Inc., Phoenixville, Pa.; wheels, grinding 1,981
Henry Disston & Sons, Inc., Philadelphia; armor plates 26,200
Eagle Grinding Wheel Co., Chicago; wheels, grinding 1,705
Earle Hart Woodworking Machine Co., the Tannewitz Works, Grand Rapids, Mich.; band, saws 1,244
Eaton Mfg. Co., Detroit; springs. 6,280
Elgin Softener Corp., Elgin, Ill.: unit, water softening 1,071
John Evans' Sons, Inc., Philadelphia; springs 1,058
Ex-Cell-O Corp., Continental Tool Works Div., Detroit; mills 1,477
Federal Prison Industries, Inc., Dept. of Justice, Washington; boxes, tool steel 3,118
Foster, Miller & Bierly, Inc., Philadelphia; wheels, cast steel 1,069
Franklin Lumber Co., Newark; lath and shingle 1,102
General Machinery Corp., Hamilton, Ohio; mills, vertical boring and turning 321,014
Grainger-Rush Co., Pawtucket, R. I.; cable 10,907
Great Southern Box Co., Inc., New Orleans, La.; boxes, wire 1,116
Greenfield Tap & Die Corp., Greenfield, Mass.; taps 2,689

AWARDS

Hamilton Metal Products Co., Hamilton, Ohio; steel chests .. 1,400
Hardinge Brothers, Inc., Elmira, N. Y.; lathes 3,200
Hawkridge Brothers Co., Boston; tool steel 1,520
Heppenstall Co., Bridgeport, Conn.; steel 3,168
Hydraulic Controls, Inc., Chicago; sets, hydraulic steering 3,955
Ideal Upholstering Co., Springfield, Mass.; small arms materiel 3,270
International Engineering Works, Inc., Framingham, Mass.; steel chests 2,306
JCH Automatic Machine Works, Philadelphia; artillery ammunition components 1,237
Jones & Lamson Machine Co., Springfield, Vt.; lathes 148,677
Kux-Lohner Machine Co., Chicago; presses, tablet 106,390
A. B. Landis Sons, Inc., Philadelphia; artillery ammunition components 2,349
Langelier Mfg. Co., Providence; drills 13,650
Louisville Electric Mfg. Co., Louisville, Ky.; hacksaws, power .. 4,646
Lufkin Rule Co., Saginaw, Mich.; calipers 1,182
Manning, Maxwell & Moore, Inc., Jersey City; tools 1,637
McGonegal Mfg. Co., East Rutherford, N. J.; grinders 2,631
McKiernan-Terry Corp., Dover, N. J.; machines, pneumatic staking 10,860
Mill-Rose Co., Cleveland; brushes, cleaning 22,755
Mohawk Machine & Tool Co., New York; gages 6,954
Montgomery Elevator Co., Moline, Ill.; elevators 12,894
Murdock Tool Co., Detroit; pilots, counterbore 3,175
National Machine Tool Co., Racine, Wis.; shears, hand 1,069
New York Thread Grinding Corp., New York; gages 1,222
Niles-Bement-Pond Co., Pratt & Whitney Div., Hartford; gages, thread 3,795
Norton Co., Worcester, Mass.; wheels, grinding 1,439
Ohio Seamless Tube Co., Shelby, Ohio; seamless steel 2,367
Pennsylvania Electric Steel Casting Co., Hamburg, Pa.; castings, steel 2,870
Pennsylvania Tool & Mfg. Co., York, Pa.; gages 23,675
Peters Engineering Co., Philadelphia; hoppers 2,895
Peterson Brothers Tool Co., Milford, Mass.; gages 6,755
Porter Forge & Furnace, Inc., Everett, Mass.; forgings, steel. 1,613
Putnam Tool Co., Detroit; end mills 1,185
Reed Mfg. Co., Erie, Pa.; wrenches 13,379
Remington Arms Co., Inc., Bridgeport, Conn.; small arms materiel 29,922
Reska Spline Products Co., Detroit; gages, thread 3,644
B. M. Root Co., York, Pa.; saws. 4,790
Ryerson & Sons, Chicago; rings.. 1,293
Savage Arms Corp., J. Stevens Arms Co. Div., Chicopee Falls, Mass.; small arms materiel ... 5,962
Snap-On Tools Corp., Kenosha, Wis.; wrenches, socket 3,324
Somerville Machine & Foundry Co., Somerville, Mass.; castings, bronze 7,495
Sponge Air Seat Co., Inc., Buffalo; covers, headlight 2,824
Standard Machinery Co., Providence; presses, draw 9,266
Standard Pressed Steel Co., Jenkintown, Pa.; nuts 1,836
L. S. Starrett Co., Athol, Mass.; calipers 9,500
F. J. Stokes Machine Co., Philadelphia; presses 196,950
Sun Mfg. Co., Chicago; testers, motor 2,625

Aluminum Company of America
Vancouver, Wash.

Carey Elastite

INDUSTRIAL FLOORING

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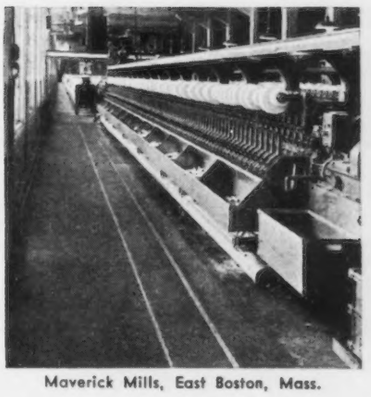
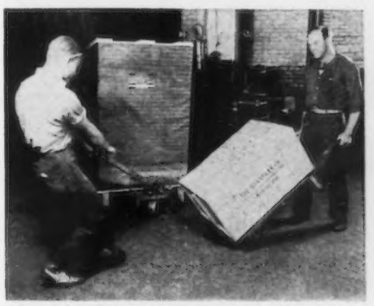


Maverick Mills, East Boston, Mass.

THIS improved flooring, a development of CAREY research, is tougher, longer wearing—a flooring that can take a beating from wheeled traffic and yet that is resilient and comfortable for workmen. It reduces accidents and steps-up efficiency. Withstands highly compressive loads and rough usage.

An ideal material for factory, warehouse and machine shop floors; loading platforms; offices; laboratories; stores. It is fire-safe, moisture and weather resistant. Also specified for protection of built-up roofs subjected to traffic — makes them valuable for use as sun decks or recreational activities.



Receiving-Shipping department Hennegan Company, Cincinnati, Ohio.

CAREY ELASTITE Industrial Flooring is a compound of asphalt and mineral filler, reinforced with asbestos fibres, densely compressed and die cut to size. Available in black and red colors in 1/2" thickness, and in sizes 12" x 12" and 12" x 24".

This modern floor helps to reduce accidents, lower maintenance, save time, improve appearance, promote cleanliness. Specify it for new construction and for resurfacing rough or worn floors. Write today for catalog and samples—Address Dept. 26.

THE PHILIP CAREY COMPANY • Lockland, Cincinnati, Ohio
Dependable Products Since 1873
IN CANADA: THE PHILIP CAREY COMPANY, LTD. Office and Factory: LENNOXVILLE, P. Q.

Aluminum Shortage Closes Two Plants

Youngstown

• • • **Difficulty in maintaining** its operations is reported by the Youngstown Mfg., Inc., here, which fabricates trim for products entering homes, stores and offices. According to H. E. Schuler, president, the company's problems are typical of many non-defense industries today.

"At a conservative estimate we use 100,000 lb. of aluminum in the form of extruded shapes a month," said Mr. Schuler. "Recently we haven't been able to obtain a single pound from our regular sources of supply. Two of our eight branch plants, located at Seattle and Chicago, have been closed, and 30 men laid off. Our aluminum shapes are all purchased to customer's specifications.

"We spent a week in Washington and were unable to get anything beyond promises of possible relief in the latter part of this year. If we can find scrap we are able to have it extruded, but the price of the scrap is so high that no profit is possible."

According to Mr. Schuler, the company was able to obtain 30,000 lb. of high tensile aluminum billets late last week, but paid a premium of 37c. per lb.

"We tried using plastics," said Mr. Schuler. "We thought of stainless, but having had stainless on order for over two months already without any sign of receiving shipment soon, it does not seem that stainless can be adapted by companies like my own. In our opinion, brass is getting tight also."

OPM Investigates Tungsten Tightness

Washington

• • • **As a result of recent** conferences in New York between tool steel industry and government representatives, the OPM has started an investigation of what it describes as "the difficult situation in tungsten." Subjects under discussion at the New York meeting included the use of substitutes for tungsten, the necessity for filling defense orders ahead of non-defense requirements, and the uncertainty of tungsten shipments via the Burma Road.

At the New York meeting, attended by Dr. Samuel S. Stratton, general assistant director of the minerals and metals group of OPM, and Walter S. Tower, producers' representative on the steel priorities committee, tool steel manufacturers were urged to give every consideration to the use of substitutes, including molybdenum tool steels or other alloy combinations found to be acceptable substitutes.

Although producers were represented as agreeing to exert every effort to fill defense orders ahead of non-defense requirements, it was reported that a close check is to be kept on the tungsten situation so that "additional steps can be taken when and if necessary."

★ Logan Roller Spiral speedily and efficiently lowers kegs of nuts, bolts and heavy hardware from packing room on floor above, to storage area shown. No freight elevator delays. No power required. Virtually no maintenance. Part of this company's "flowing" production line. •
NUTS-to you!

AND BOLTS, too! Kegs of heavy hardware, nuts, and bolts, get their start in your direction via the Logan Spiral shown above. Part of a Logan installation that cuts costs many ways. Here is another firm whose foresight in conveyorizing with Logan, places it in an enviable position today with regard savings in time, effort, space, better production control, and improved working conditions. Are *your* handling methods a help or a hindrance? Write for pertinent bulletins, or for nearest engineer to call. LOGAN CO., Incorporated, 545 Cabel, Louisville, Ky.

Logan Conveyors

PUT *FLOW* INTO PRODUCTION

South Bend Workers Average $35.03 a Week

South Bend, Ind.

• • • South Bend industrial workers received the highest wage in Indiana during January. South Bend workers earned $35.03 per week. East Chicago was second with $34.76, Gary third with $33.36 and Indianapolis took fourth place with $31.39. Gary had the largest industrial payroll in the state with 31,314 employed, and ranked second only to Indianapolis in total payrolls.

It was also announced that the National Defense Advisory Commission's price stabilization division had requested the Tariff Commission to investigate the cost of copper production in various producing regions. The commission made a similar study in 1932 before the imposition of an import tax amounting to 4c. a lb., but the price division requested more current information to be used together with wage and other data growing out of the defense program.

Aid Sought for Non-Defense Aluminum Fabricators

Washington

• • • In a move to benefit aluminum fabricators in non-defense industries, the OPM Priorities Division last week asked aircraft manufacturers to release to secondary smelters available supplies of mixed scrap but retain high grade alloy sheets pending the receipt of additional instructions from Washington.

An OPM announcement called it clear that most of the high grade aluminum available will be required by defense industries for the immediate future but it was disclosed that the problem of obtaining as much aluminum as possible for civilian channels continues to be discussed. After a check and inspection of producers' order books and inventories, a system for actual allocation of aluminum supplies to defense plants is expected to be adopted. Such an allocation system probably will be applied to March orders.

Blanket Licensing of Exports to U.K. Extended

• • • The system of blanket licenses which permits export of certain iron and steel products to the United Kingdom without special permits from the U. S. government has been further extended and now covers some 140 items of raw materials and semi-finished products. A complete list of these commodities can be had from the British Iron & Steel Corp., 37 Wall Street, New York. The procedure has also been modified so as to accelerate shipments. In the future exporters need not give the name of the consignee to the supplier of the material, but are required to report and explain the transaction immediately to the British.

Right Down Your Alley!

IF you are cleaning non-ferrous stampings or castings (aluminum alloy, magnesium alloy, copper and brass) during processing, cleaning between drawing operations, after drawing and before annealing, investigate Wyandotte MK-50 Solvent Detergent for use in metal-parts washing machines.

MK-50 is seldom used at greater strength than one gallon in 500 gallons of water.

Wyandotte MK-50 Solvent Detergent also is used in metal-parts washing machine cleaning before painting, lacquering or enameling.

Your Wyandotte Representative will be glad to give you more information. Write us.

Wyandotte PRODUCTS
SERVICE REPRESENTATIVES IN 88 CITIES

THE J. B. FORD SALES CO. • WYANDOTTE, MICHIGAN

Plane Wing Output Lifts Auburn Payroll 4 Times

Connersville, Ind.

• • • **Production of airplane** wings will expand employee payrolls about four times at the Auburn Central Mfg. Corp., here. The firm is successor to the old Auburn Automobile Co. Defense contracts will force employment upward from 500 to 2000 and production is expected within 60 days. The plant occupies floor space of about 750,000 sq. ft. Machinery and materials are now moving into the plant, some machinery coming from Memphis, Tenn. Training of employees is underway. Buchard Wilson, formerly with Vultee, will be general superintendent. Eric O. Johnson is vice-president and general manager. The company's regular products are light delivery trucks, auto bodies, stampings and sheet metal products.

THESE "Suicide Springs" for ammunitions are called on to do their *vital* job but once—and *that job blows them to "smithereens!"*

For their lifetime of one single spring action, they're built to the same fine tolerances—with the same care, precision and accuracy that goes into all Accurate Springs.

For what purpose do you want springs? You can get them at Accurate.

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SPRING HANDBOOK — *full of valuable data. Write for your free copy today!*

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ACCURATE SPRING MFG. CO.

3819 West Lake St. Chicago, Illinois

Alabama Industrial Leaders To Discuss Defense Problems

Birmingham

• • • **Problems of industry** growing out of the national defense program, will be discussed at a regional conference of Alabama and national business leaders, March 21, at Mobile, J. Handly Wright, vice-president of the Associated Industries of Alabama, has announced. The meeting is sponsored jointly by the A.I.A., the National Association of Manufacturers, the Mobile Chamber of Commerce and the Junior Chamber of Commerce. Among those expected to attend the meeting are R. G. Coombe, vice-president of the Central Hanover Bank, New York, and Capt. A. D. Reed, liaison officer between the Navy and the OPM.

Defense Contracts Reach Total of $12.3 Billions

• • • **Defense contracts** placed by the government during the first half of February and from July 1 to Feb. 15 are broken down as follows by the Office of Government Reports:

	Feb. 1-15	July 1-Feb. 15
Army contracts	$158,367,364	$5,187,257,436
Navy contracts	82,213,521	6,392,453,287
Maritime Commission:		
Emergency shipbuilding program	19,141,500	33,374,500
Federal Works Agency:		
WPA defense projects	40,565,322	199,317,729
USHA defense housing	.....	19,868,799
PBA Army housing	3,664,000	34,197,500
Federal Security Agency:		
Defense training	.....	27,350,787
Federal Loan Agency:		
Defense Plant Corp.	53,358,688	371,138,371
RFC	.....	112,094,838
Totals	$357,310,395	$12,377,053,247

Weirton Expansion Gets Certificate of Necessity

Weirton, W. Va.

• • • **A certificate of necessity** has been issued jointly by the War Department and the National Defense Council to National Steel Corp. for a blast furnace, coke ovens and other facilities to be constructed by the Weirton Steel Company, according to T. E. Millsop, president of the Weirton company. Details of the expansion had previously been announced.

8 Training Courses Offered Calumet Steel Workers

East Chicago, Ind.

• • • **Eight free courses** important to defense work will be offered industrial workers in the Calumet steel section here, under direction of C. W. Beese, head of the general engineering department of Purdue University. Classes will be held at night in the Roosevelt high school here. Paul E. Chapman, Inland Steel Co., is in charge of the local organization. Classes will be conducted by Paul Nutting, Inland Steel Co., in elementary metallurgy; by Sydney Nashner, Inland Steel Co., in welding; by James W. Halley, also of Inland, in properties and applications of alloys; by Dr. I. N. Goss, consulting engineer, in two classes on physical metallurgy and metallography of iron and steel; by P. R. Gravenstreter, Carnegie-Illinois Steel Corp., in electronics; by Calvin C. Brown, Inland Steel Co., in open hearth processes. Instructor for the class in tool and die design has not yet been chosen.

Worcester SWOC Members Strike for Higher Wages

• • • **Last week 300** employees of the Worcester Pressed Steel Co., Worcester, Mass., walked out on two separate occasions as a maneuver to enforce demands for higher wages and other benefits. Trusten P. Draper, general manager, identified the men as members of the SWOC, a CIO affiliate. Working conditions are now normal. The company is making motor parts for aircraft, as well as pressed steel casings for the Army and machine gun parts for the British government.

Bingham Stamping To Reorganize

Toledo

• • • **A plan of capital** reorganization whereby the Bingham Stamping Co. will scale down its capital to $300,000 and convert its two classes of stock into a single common issue, eliminating accrued preference dividends, will be put before stockholders at their annual meeting March 11. Company earned $141,797 after taxes in 1940.

Borg-Warner Increases Steel-Making Capacity

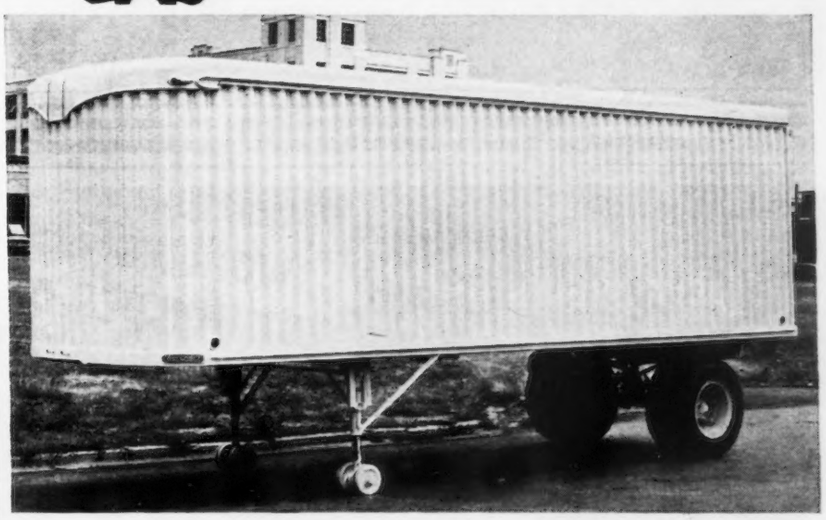
Chicago

• • • **Expansion of plants** at Newcastle, Ind., and Kalamazoo, Mich., has been undertaken by Ingersoll Steel & Disc division of Borg-Warner Corp. A third expansion at West Pullman, near Chicago, is close to completion. The Newcastle addition will be approximately 80 x 240 ft. A removable roof furnace with eight to 10 ton capacity, ladles, grinding and chipping equipment, etc., will be installed in the new building, which is expected to substantially increase the firm's steel-making tonnage at this plant. Increased furnace capacity will be installed at Kalamazoo, also. Expansion at West Pullman is for the defense shell contracts held by the company.

DOES EXTRA WEIGHT

Hitch-Hike

ON YOUR TRAILERS?



● Truck-trailers must be strong. Yet there is a good chance your fleet hauls an invisible though costly hitch-hiker: *too much* weight.

These trailers, made of corrugated ARMCO High Tensile Steel, can help get rid of dead weight. Weight saved on the trailer goes into heavier payloads, added earnings.

This is why: the increased yield strength of ARMCO High Tensile Steel permits more efficient design. Corrugated sheets make it possible in many cases to build sections with *only 60 to 65 per cent* of the weight of ordinary types of construction. You get more loading space with less dead weight.

All parts of a trailer can be "made one" by smooth, dense welds. And you will get excellent ductility from ARMCO High Tensile Sheets, a clean paintable surface, and consistent flatness and uniformity in every shipment.

Inquire about ARMCO High Tensile Steel for your truck-trailers. Ask us how this modern metal boosts payloads even as it lowers operating costs. Write to The American Rolling Mill Company, 870 Curtis Street, Middletown, O.

ARMCO ARMCO **HIGH TENSILE STEELS**

FLUOR SPAR

Guaranteed
85% plus in
Calcium
Fluoride
Not to exceed
5% silica
In bulk

HILLSIDE FLUOR SPAR ROSICLARE

Barges
500 tons
Ohio River
from our
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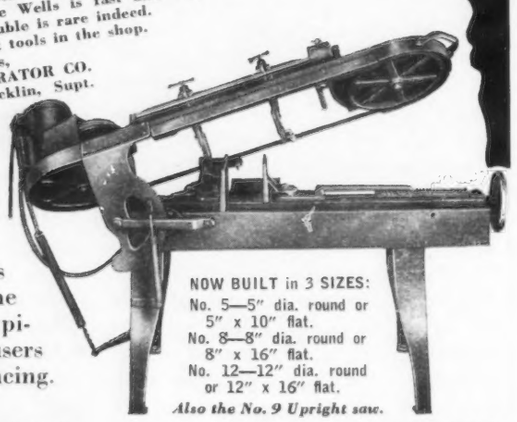
"OUR NEW WELLS SAW IS ONE OF THE HANDIEST TOOLS IN THE SHOP!"

Says WORLD'S LARGEST BUILDER OF MAGNETIC EQUIPMENT

Our new Wells Saw is performing beautifully—we wonder now how we got along without it. It replaces an old machine that caused a bottleneck. Now we have no trouble as the Wells is fast and very accurate. It works 16 hours a day and blade trouble is rare indeed.

It is one of the handiest tools in the shop.

Very truly yours,
DINGS MAGNETIC SEPARATOR CO.
(Signed) D. Stricklin, Supt.



NOW'S the time to replace obsolete equipment with a speedy, accurate, dependable Wells Saw. Take a tip from the testimonial above—it's typical of results. Wells Saw users everywhere are experiencing. Write for details now.

NOW BUILT in 3 SIZES:
No. 5—5" dia. round or 5" x 10" flat.
No. 8—8" dia. round or 8" x 16" flat.
No. 12—12" dia. round or 12" x 16" flat.
Also the No. 9 Upright saw.

WELLS MFG. CORP.
Three Rivers, Michigan

WELLS METAL CUTTING BAND SAWS

Carlton to Discuss Plane Manufacture Before SAE

• • • **A discussion of** "Coordination of Aircraft Manufacture in Automobile Plants" will be given at the National Aeronautics Meeting of the Society of Automotive Engineers, March 13 and 14, at Hotel Washington, Washington, D. C., by C. C. Carlton, director of the Automotive Committee for Air Defense. He will be the featured speaker at the annual aeronautics banquet.

Other topics to be covered included "Compounding Facts and Fallacies" by F. L. Prescott, U. S. Army Air Corps., Wright Field; "Design of Airscoops for Aircraft Carburetors," M. J. Kittler, Holley Carburetor Co.; "Present Status of Combustion Research," Ernest F. Fiock, National Bureau of Standards; "Some Factors Influencing Aircraft-Engine-Propeller Vibrations" by C. M. Kearns, Hamilton Standard Propellers, Div. United Aircraft Corp.; "Considerations of the Design of Modern Aircraft Propellers" by T. B. Rhines, Hamilton Standard Propellers, Div. United Aircraft Corp.; "Vibration Characteristics of Three and Four-Blade Propellers for High-Output Engines" by R. M. Guerke, Curtiss Propeller Div., Curtiss-Wright Corp.; "Development of the Ercoupe" by F. E. Weick, Engineering & Research Corp. (Prepared discussion—J. H. Ceisse, Civil Aeronautics Administration).

Also "Some Present Day Problems in Light Airplane Engines" by Ralph S. White, Civil Aeronautics Administration; "More Aircraft Engines for National Defense" by Henry C. Hill, Wright Aeronautical Corp.; "Cooling Characteristics of Submerged Light Aircraft Engines" by H. A. Ellerbrock, National Advisory Committee for Aeronautics; "Icing Problems Attendant to the Operation of Transport Aircraft," by R. L. McBrien, United Air Lines Transport Corp. (Motion picture and discussion—Allan A. Barrie, Western Air Express Corp.); "The Development of a New Lateral Control Arrangement" by Paul Baker, Vought-Sikorsky Aircraft Div., United Aircraft Corp.

Harbison-Walker Earns $2,513,936 For 1940

Pittsburgh

• • • **Harbison-Walker** Refractories Co. reports a net profit of $2,513,936 for 1940, equivalent after payment of dividends on preferred stock to 1.71 a share on outstanding common stock. This compares with a net income of $1,869,000 or $1.24 a share on common stock in the previous year. Taxes for the year amounted to $1,604,027 compared with $911,626 in 1939, and these sums do not include social security taxes. Taxes paid by Harbison-Walker in 1940 amounted to $1.18 a share common stock and represented almost 40 per cent of the earnings of the company before taxes for the year 1940.

Plane, Ship Industries To Need Half Million Men

Chicago.

• • • **Aircraft and shipbuilding** alone will require 500,000 new men by late 1942 if the defense program maintains its expected pace, the American Management Association was told here. Michael Kane of the National Defense Advisory Committee's "training within industry" staff, declared aircraft employment would reach 455,500 by August of this year; and Charles S. Mattoon, personnel director of Curtiss aircraft division of Curtiss-Wright Corp. estimated it would reach 500,000 by next January. Kane also pointed out that shipbuilding will require 261,500 additional men by November, 1942, of which 174,000 will be needed before the close of 1941.

Mr. Mattoon stated that Curtiss will have more floor space by July 1 of this year than existed in the entire industry in September, 1939. Speaking of the 50,000 annual plane production program, Mattoon said that the industry could do the job "if it is permitted to go ahead without interference from those ignorant of the peculiar problems of airplane manufacture."

SWOC Keeps Non-Union C-I Workers Away from Jobs

Gary, Ind.

• • • **"To get union steel** for defense," in the words of a union official, Round-up Day was recently conducted by the SWOC at the plants of Inland Steel Co., Youngstown Sheet & Tube Co., and the sheet and tin mill of Carnegie-Illinois Steel Corp. The round-up was part of a drive to gain 100 per cent membership in the union at these plants. Pickets stopped employees going to work at the gates and if unable to show union membership cards were refused admittance to the plants. Union members who were delinquent in dues were also kept away from work. About 1000 were kept out of Carnegie's sheet and tin mill after the first "R-Day." Non-union members at this mill asked the company for protection against union organizers.

ANY METAL • ANY PERFORATION

Industrial—Well balanced screens of excellent material and workmanship to assure maximum screen production combined with durability.

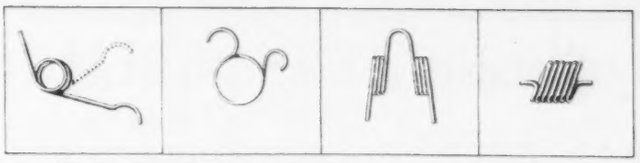
Ornamental—Approved patterns and finishes including many exclusive and characteristic designs for grilles and furniture. We invite your inquiries.

The Harrington & King Perforating Co.

5657 FILLMORE STREET—CHICAGO, ILL.
New York Office, 114 Liberty Street

the practical side of Springmaking—BY DUNBAR

Some tips on TORSION SPRINGS



- They should be free on rod or post—when under full load.
- The action should tend to reduce or wind the coils.
- Sharp bends should be eliminated.
- Material should be selected for individual conditions of temperature, corrosion or stress.
- Ends should be designed for easy assembly.

WE RECOMMEND
that you send us your assembly. We may be able to anchor one arm to it—or change the contour to save on assembly time.

Dunbar Bros. Co.
DIVISION OF ASSOCIATED SPRING CORPORATION
BRISTOL, CONNECTICUT
"Quality Springs Since 1845"

Substitution of Spiegel For Ferromanganese Urged

Washington

• • • **Prepared by the** Technologic Committee on Manganese of the National Academy of Sciences, John D. Biggers, Director of the OPM Production Division, made public last Friday a report suggesting use of spiegel as a substitute for ferromanganese and emergency conservation of manganese through consumer-producer cooperation. The committee, made up of high ranking scientists, was appointed on July 25 of last year to review projects for the development of new processes for recovery of manganese from low grade domestic ores. The chairman of the committee is Clyde Williams, director, Battelle Memorial Institute, Columbus, Ohio.

The report said that 20 per cent of the consumption of ferromanganese could be saved by emergency conservation. In discussing substitution of spiegel for ferromanganese the committee pointed out that certain domestic ores are available for production of spiegel and production facilities could be built in sufficient time to cover the emergency.

The committee said that a careful survey of the various grades of steel produced in this country shows that from a metallurgical standpoint spiegel could, if necessary under emergency conditions and subject to certain reservations, be substituted for at least 20 per cent of the required ferromanganese.

This saving was said to be equivalent to about 200,000 tons of ore carrying 50 per cent manganese, "an amount considerably greater than the immediate possible production of such high grade ore from any domestic source now known."

Knudsen Now Urges 40-Day "Cool-off" Law

Washington

• • • A conciliation plan for defense industries, providing for a mandatory 40-day cooling-off period before a strike is called, was proposed to Congress late last week by OPM Director General William S. Knudsen.

In a memorandum directed to Chairman Hattan Sumner of the House Judiciary Committee, Mr. Knudsen altered an expression he made on the subject two weeks ago while appearing before the committee. At that time he said that a cooling-off period, while desirable, should not be imposed by legislation. His statement at that time was in substantial agreement with one made by OPM Associate Director General Sidney Hillman.

Under the Knudsen proposal, which was sent to the Judiciary Committee following the OPM's successful efforts to end the Bethlehem Steel strike at Lackawanna, failure of either party to defer strike action until termination of the cooling-off period would mean a forfeiture of rights before the National Labor Relations Board under the Wagner Act.

CIO Shut Out of Jobs At New Ordnance Plant

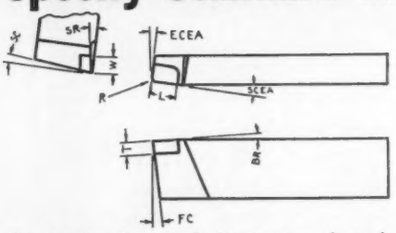
Hammond, Ind.

• • • **United Construction Workers** (CIO) are up in arms over their failure to get jobs at the Kingsbury ordnance plant under construction in LaPorte County, Ind. The CIO affiliate claims that there is no closed shop contract and yet only AFL members are getting the jobs, of which there will eventually be about 2000. However, Virgil Morris, general representative of the AFL building laborers' union said the union had what amounted to a closed shop by extension of contracts between the contractor and local unions. The Army Quartermaster's office at the ordnance plant said the AFL had been considerate in handling the employment problem, permitting the hiring of non-union members when required. It was said that a bargaining election under the direction of the NLRB had been held with the AFL emerging victorious.

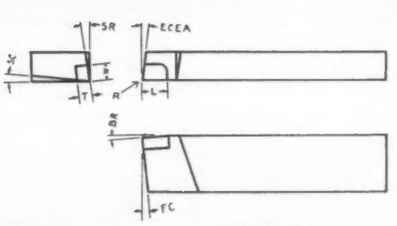
SAVE TIME WHEN ORDERING CARBIDE TOOLS

Style No. 11 Tool — Style No. 3 Tool

Specify Standard KENNAMETAL Tools



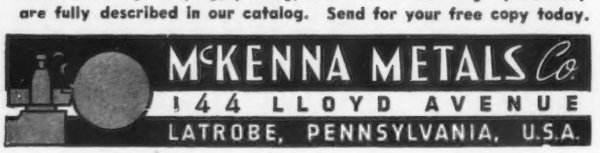
For turning bar stock, forgings, and steel castings in lathes and boring mills, Style 11 KENNAMETAL-tipped tools, with side cutting edge angles, will give the most service. For facing, or for left hand travel, use Style 12, the opposite hand of Style 11.



For turning up to a 90° shoulder use a Style 3 KENNAMETAL tool, and for facing to a 90° shoulder use a Style 6 tool (opposite hand) . . . both tools having an 0° side cutting edge angle. For most other turning and facing operations, use Styles 11 and 12.

See Our Exhibit at BOOTH 345 • A. S. T. M. SHOW Detroit, Mich. March 25-29

Other standard KENNAMETAL tools for turning, facing, boring, straddle facing, shaping, planing, and other machining operations, are fully described in our catalog. Send for your free copy today.



New West Coast Plant to Make Aluminum Castings

Los Angeles

• • • **Roland T. Kinney,** vice-president of the Kinney Iron Works, announced that he and his brother, Wendell H. Kinney, will immediately start construction of a new foundry and forge shop devoted to the manufacture of aluminum alloy castings and forgings. Products of the new firm will be used principally by the rapidly growing aircraft industry.

The new 50,000 sq. ft. plant will be located in the Los Angeles industrial area and will employ approximately 250 men. The concern will be known as the Kinney Aluminum Foundry Co. and will be managed by Bryant E. Myers, formerly associated with the Kinney Iron Works.

The Kinney Iron Works is one of the oldest and largest iron foundries on the Pacific Coast. Officers are: Wendell H. Kinney, president; Roland T. Kinney, vice-president; and L. L. Martin, director of sales.

Earnings Climb for Metal-Working Firms

Chicago

• • • **Increased earnings in** 1940 have been reported by leading metal-working companies in this industrial area. Clark Equipment Co., and subsidiary, Clark-Celfor Tool Corp., showed consolidated net profit of $1,536,933 compared with $1,182,067 in 1939. National Cylinder Gas Co. reported consolidated net income of $1,183,374 which compared with $1,001,307 for 1939. Foote Bros. Gear & Machine Corp. realized 1940 net profit of $235,404, where 1939 showed a net loss of $52,575. Fairbanks-Morse & Co., earned $2,749,678.98, or $4.59 per share, which was an increase of 47 cents per share over the preceding year. Continental Roll & Steel Foundry Co., reported net income of $812,454 against $301,269 in 1939. Caterpillar Tractor Co., Peoria, Ill., returned $8,218,441 in 1940, equivalent to $4.37 a common share, compared to the previous year's $3.29 a share. Cutler-Hammer, Inc., Milwaukee, reported net income in 1940 of $1,280,893 compared to the $814,699 earned in 1939.

Westinghouse Machine Tool Forum April 14-16

• • • **The 1941 Machine Tool** Electrification Forum will be held at East Pittsburgh, Pa., April 14-16, according to plans announced by Westinghouse Electric & Manufacturing Company, sponsors of this annual event. This will be the sixth meeting for the Machine Tool Electrification Forum, held for discussion of mutual problems between machine tool builders and electrical engineers. Machine tool delegates, members of the Machine Tool Division of the National Defense Advisory Committee and Westinghouse representatives will jointly discuss production requirements of the current emergency program.

WHEELING BRONZE SHEET PICKLERS—

are outstanding in performance—because of the oscillating feature—found only in this line of Batch Picklers.

Use this type of mechanical pickler to reduce your pickling cost.

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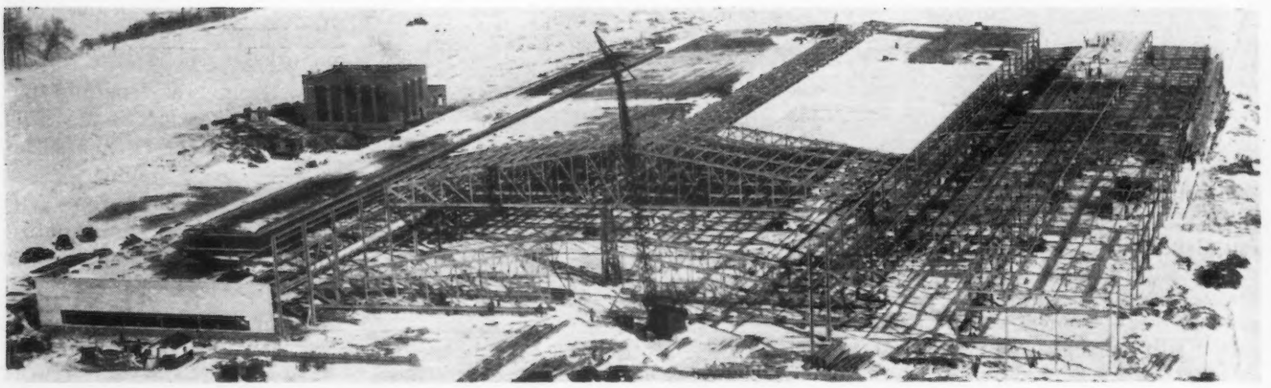
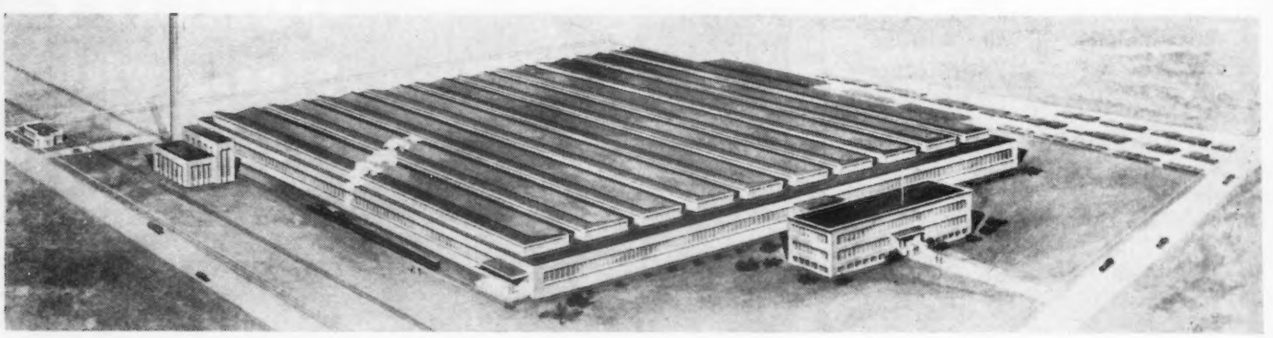
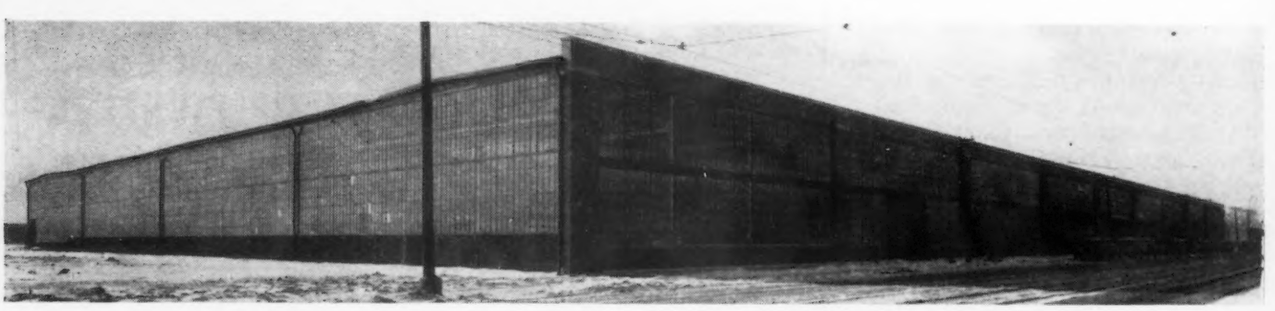


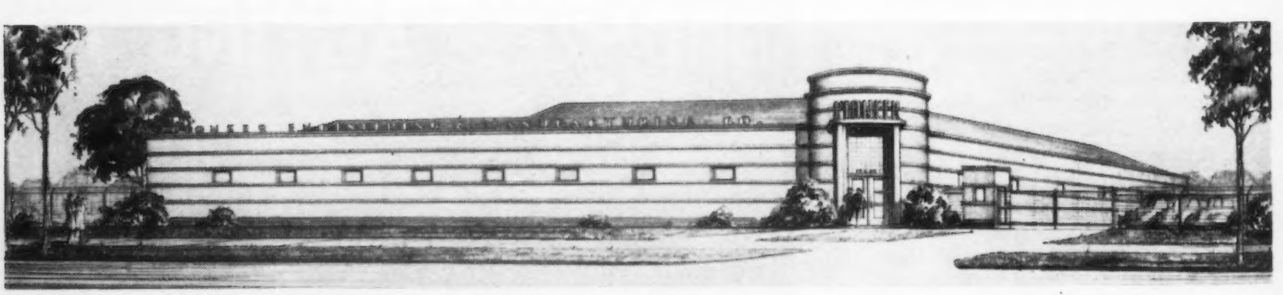
AT NIAGARA FALLS, N. Y.: Bell Aircraft Corp's new $1,050,000 plant, being built by the Austin Co., will assemble the Army's high-speed Aircobra interceptor pursuit planes. The structure contains 300,000 sq. ft.



AT PITTSBURGH: Curtiss-Wright Corp. will build this largest individual aircraft propeller manufacturing plant. Cost —$5,221,100. Employees—4000. Site—32 acres in Beaver borough. Floor space—415,000 sq. ft. Production will begin in late summer.



AT CHICAGO: Ceco Steel Products Corp. increased its plant capacity 50 per cent to meet a growing demand for steel windows and to fill a need for space made necessary by its Bonderizing process. Two more sections will be built.



AT DETROIT: Pioneer Engineering & Mfg. Co. is ready to occupy one of the first industrial buildings erected in accordance with recommendations of the FBI, Navy and Army. Details of special precautions against saboteurs are withheld by the company.

Nickel Shortage May Bring Substitutions And Redesigning

• • • **Anticipating the possibility** that the current shortage of nickel may eventually result in the imposition of mandatory priorities, as in the case of aluminum, a good many users of nickel or nickel alloy steels are working on the substitution of other metals or elements, which in some instances will necessitate the redesigning of parts.

A survey of the nickel situation is being made by the U. S. Bureau of Mines at the direction of the Office of Production Management. Announcement that the survey was being undertaken was made by W. A. Harriman, chief of the materials branch of the OPM.

Mr. Harriman pointed out that approximately 85 per cent of all nickel produced in the world is obtained in Canada. While previous estimates have indicated that sufficient supplies would be available for all defense and civilian requirements, it is stated in Washington that informal investigations of complaints of shortages have led to the belief that some consumers are seeking to acquire unnecessarily large inventories. This coincides with the statement issued last week by Robert C. Stanley, chairman and president of the International Nickel Co. of Canada, who said:

"The immediate calls for nickel by the nickel consuming industries in the United States are considerably larger than the supply which is now being provided. It is questionable, however, whether the actual United States needs for nickel, as reflected by the consumption of the products of the nickel consuming industries, exceed the available supply. It seems apparent that there is an inflation of demand as compared with real consumption. The calls have been temporarily inflated through the tying up of substantial quantities of nickel in process and in intermediate products with each addition of new units producing alloy steels and other nickel-containing industrial products."

Saying that the supply is being allocated to all consumers as equitably as possible, Mr. Stanley added that "The studies which are in progress in cooperation with large consumers indicate that the nickel supply will be ample for the needs of the national defense program and British and Canadian orders placed in the United States, and also should provide for a volume of commercial requirements."

In a recent statement on priorities, E. R. Stettinius, Jr., Director of Priorities, said that, while no

FORD MOTOR CO. STEEL SPECIFICATIONS

Revised April 9, 1940

Ford Type	Carbon Range	Manganese Range	Chromium Range	Silicon Range	Phosphorus	Sulphur	
A	.20- .24	.60- .75	.65- .80	.10- .15	.030 Max	.040 Max.	Vanadium .12-.15
AX	.18- .22	.50- .65	.75- .90	.10- .20	.030 Max	.040 Max	
AA	.26- .30	.65- .80	.80-1.00	.10- .20	.030 Max	.040 Max	
AAA	.30- .35	.65- .75	.90-1.10	.10- .20	.030 Max	.040 Max	
AAAH	.35- .38	.65- .75	.90-1.10	.10- .20	.030 Max	.040 Max	
AAAAL	.38- .42	.65- .75	.90-1.10	.10- .20	.030 Max	.040 Max	
AAAA	.42- .47	.65- .75	.90-1.10	.10- .20	.030 Max	.040 Max	
AAAAA	.48- .52	.65- .75	.90-1.10	.10- .20	.030 Max	.040 Max	
AA Select	.28- .32	.65- .80	.80-1.00	.10- .20	.030 Max	.040 Max	
AAA Select	.32- .35	.65- .80	.90-1.10	.10- .20	.030 Max	.040 Max	
Armature Steel	.05 Max	.30 Max		.12- .28	.030 Max	.040 Max	
B	.95-1.05	.20- .30	.40- 50	.20- .30	.030 Max	.040 Max	
BB	.95-1.05	.20- .30	.90-1.10	.20- 30	.030 Max	.040 Max	
BBB	.95-1.05	.30- .40	1.25-1.50	.20- .30	.030 Max	.040 Max	
Bessemer No. 1	.09- .13	.70- .90			.090-.130	.100-.200	
C Key Stock (SAE 1035)	.30- .40	.50- .80		.10- .20	.050 Max	.050 Max	
C Pure Iron	.03 Max	.12 Max			.010 Max	.040 Max	Copper—Optional
Chrome Non-Shrink	1.45-1.60	.25- 35	11.00-12.00	.20- .40	.030 Max	.040 Max	V .20-.25 Mo. .70-.90
CC	.44- .50	.40- .55	.70- .90	.15- .25			Tungsten 1.00-1.20
D	.45- .52	.80- .95	1.00-1.20	.10- .20	.030 Max	.040 Max	
DD	.48- .52	.80- .95	1.00-1.20	.10- .20	.030 Max	.040 Max	
Die Block Ajax	.60- .75	.30- .40	3.25-3.75	.10- .20	.030 Max	.040 Max	
Die Block Hammer	.47- .55	.50- .60	.60- .75	.10- .20	.030 Max	.040 Max	Nickel—1.50-1.75
E	.27- .35	.70- .90		.07- .15	.040 Max	.050 Max	
EE	.35- .40	.70- .90		.07- .15	.030 Max	.050 Max	
EEE	.40- .45	.70- .90		.07- .15	.030 Max	.050 Max	
EEEE	.46- .53	.80- .95		.10- .20	.030 Max	.050 Max	
Electrical Steel	.05 Max	.30 Max		.90-1.20	.030 Max	.030 Max	
F	.08- .15	.80- .99		.10- .20	.040 Max	.080-.150	
FF	.15- .20	.80- .99		.10- .20	.040 Max	.100-.150	
FFF	.34- .40	.80- .99		.10- .20	.040 Max	.100-.150	
FFFF	.45- .50	.80- .99		.10- .20	.040 Max	.100-.150	
Ford High Speed Steel*	.65- 73	.25- .35	3 75-4.25	.20- .30	.030 Max	.040 Max	V1.00-1.25 W17.00-18.00
Ford Hot Work Steel	.18- .23	.40- .60	1.40-1 60	.15- .25	.040 Max	.040 Max	Mo. .45-.55
Ford Spec. High Speed	.78- .84	.25- .35	4.00-4 50	.20- .50	.030 Max	.040 Max	V 2 00-2 25W18.00-19 00 Mo .50-.80
G	.08- .15	.30- .45		.07- .15	.030 Max	050 Max	
GG	.15- .20	.30- .45		.07- .15	.040 Max	.050 Max	
H	.27- .37	.45- .60		.07- .15	.040 Max	.050 Max	
Key Stock (S.A.E. 2330)	.25- .35	.50- .80			.040 Max	.045 Max	Nickel 3.25-3.75
L	.23- .30	.35- .50			.040 Max	.050 Max	
Low Carbon Open Hearth	.05- .15	.30- .50			.040 Max	.050 Max	
Machine Steel	.08- .20	.35- .50		.10- .20	.040 Max	.050 Max	
Magnet	.82- .90	.30- .45	2.25-2 60	.25- 40	.030 Max	.040 Max	
N	.12- .16	.35- .45	.30- .40	.10- .20	.030 Max	.040 Max	
R	.70- .80	.20- .35	.10 Max	.15- .25	.025 Max	.030 Max	Nickel-None
RR	.95-1.05	.20- .35	.10 Max	.15- .25	.025 Max	.030 Max	Nickel-None
RRR	1.20-1.30	.20- .35		.15- .25	.025 Max	.030 Max	
Rustless Steel No. 1	.05- .12	.30- .45	16.00-18.00	.15- .30	.040 Max	.050 Max	Nickel 7.00-9.00
Rustless Steel No. 2	.05- .10	.30- .45	16.00-18.00	.50 Max	.040 Max	.050 Max	
Rustless Steel No. 3†	.10- .20	.45-3.00	15.50-17.50	.75 Max	.030 Max	.030 Max	Nickel 5.50-8.50
Rustless Type II	.20- .30	.25- .40	12.00-14.00	70-1.00	.040 Max	.050 Max	
S	.60- .70	.70- .85		.15- .20	.030 Max	.040 Max	
SS	.70- .85	.70- .85		.10- .20	.030 Max	.040 Max	
Tap Steel (Under 1" Dia.)	1.20-1.30	.25- .40	.35- .45	.30- 45	.025 Max	.025 Max	V .15-.25 W 1.25-1 50
V	.35- .45	.25- .40	1.85-2.50	3.60-4.20	.030 Max	.040 Max	
Welding Wire	.10 Max	.20 Max			.020 Max	.030 Max	
Insert Die Steel	.55- 60	.45- .60	.70- .80		.030 Max	.040 Max	Mo.75-.80 Ni 2.25-2.45
Vanadium Tool Steel	.95-1.05	.20- .35	.10 Max	.15- .25	.025 Max	.030 Max	V.40-.50 Ni—None
S.A.E. 4620	.18- .22	.30- .60	.25 Max	.15- .30	.040 Max	.050 Max	Mo.20- 30 Ni 1.65-2.00
Deep Drawing Steel	.05- .08	.28- .38	.04 Max		.030 Max	.040 Max	Copper .10 Max.
FFH	.20- .25	.80- .99		.10- 20	.040 Max	10- 15	
Hot Punch & Die Steel	.30- .35	.25- .35	4.80-5.10	.85-1.00			W1.25-1.50Mo1.60-1.80
XR Steel	.90-1.00	.20- .30	.10 Max	.15- .25	.025 Max	.030 Max	

*Taps and Drills †Not less than 24% alloying elements

CHRYSLER CORP. STEEL SPECIFICATIONS - ALLOY STEELS, AMOLA GROUP

Revised December 3, 1937

Material Standard Number	Carbon Carburizing* Structural** Thorough Hardening***	Manganese Range	Molybdenum Range	Phosphorus Max.	Sulphur Max.	Silicon Range	Remarks
M.S. 290	.20- .25*	.70- .90	.15- .25	.040	.040	.20- .30	Electric Furnace
M.S. 291	.20- .25*	.70- .90	.15- .25	.040	.040	.20- .30	Open Hearth
M.S. 278	.22- .27*	.70- .90	.15- .25	.040	.040	.20- .30	Electric Furnace
M.S. 279	.22- .27*	.70- .90	.15- .25	.040	.040	.20- .30	Open Hearth
M.S. 276	.25- .30*	.70- .90	.15- .25	.040	.040	.20- .30	Electric Furnace
M.S. 277	.25- .30*	.70- .90	.15- .25	.040	.040	.20- .30	Open Hearth
M.S. 270	.30- .35*	.70- .90	.15- .25	.040	.040	.20- .30	Electric Furnace
M.S. 271	.30- .35*	.70- .90	.15- .25	.040	.040	.20- .30	Open Hearth
M.S. 268	.35- .40**	.70- .90	.15- .25	.040	.040	.20- .30	Electric Furnace
M.S. 269	.35- .40**	.70- .90	.15- .25	.040	.040	.20- .30	Open Hearth
M.S. 266	.40- .45**	.70- .90	.15- .25	.040	.040	.20- .30	Electric Furnace
M.S. 267	.40- .45**	.70- .90	.15- .25	.040	.040	.20- .30	Open Hearth
M.S. 262	.45- .50**	.70- .90	.15- .25	.040	.040	.20- .30	Electric Furnace
M.S. 263	.45- .50**	.70- .90	.15- .25	.040	.040	.20- .30	Open Hearth
M.S. 260	.50- .55**	.70- .90	.15- .25	.040	.040	.20- .30	Electric Furnace
M.S. 261	.50- .55**	.70- .90	.15- .25	.040	.040	.20- .30	Open Hearth
M.S. 248	.55- .60***	.70- .90	.15- .25	.040	.040	.20- .30	Electric Furnace
M.S. 249	.55- .60***	.70- .90	.15- .25	.040	.040	.20- .30	Open Hearth
M.S. 246	.60- .65***	.70- .90	.15- .25	.040	.040	.20- .30	Electric Furnace
M.S. 247	.60- .65***	.70- .90	.15- .25	.040	.040	.20- .30	Open Hearth
M.S. 244	.65- .70***	.70- .90	.15- .25	.040	.040	.20- .30	Electric Furnace
M.S. 245	.63- .70***	.70- .90	.15- .25	.040	.040	.20- .30	Open Hearth
M.S. 240	.95-1.10***	.30- .50	.15- .25	.030	.035	.20- .30	Electric Furnace
M.S. 241	.95-1.10***	.30- .50	.15- .25	.030	.035	.20- .30	Open Hearth

formal priority action has been taken with respect to stainless and other nickel alloy steels, the leading producers of such steels, at the request of the Priorities Division, "have agreed to give first call to defense needs and to give technical advice to their clients which may help them reduce the amount of nickel required under present specifications."

In order to cooperate with the defense program, some manufacturing companies may soon face the necessity for making important decisions, and the following may be helpful:

1. Try to estimate how long the pinch may last. Stock in plant, source of supply, length of the war, possibilities of obtaining priorities, and the relative importance of various parts of the manufactured product, should be considered.

2. Before taking any decisive step, obtain the best opinions possible on whether other materials entering into the product are apt to become scarce also. There are items which appear likely to become temporarily unavailable.

3. Study steel specifications of the Ford Motor Co., Chrysler and General Motors Corp. The amount of nickel in a Ford car is very low; Chrysler makes wide use of Amola, and Buick has developed high manganese steel.

4. If the course of action seems sound, decide what substitutions can be made and what parts must be redesigned. From then on the problem becomes a matter of engineering efficiency and and changes in production setup. Each individual part presents a problem of its own. Some substitute parts may not be perfected successfully for years.

It should be borne in mind that probable ramifications of the armament program are just becoming known and the figures involving high quality steel are greatly in excess of anything previously talked about.

In some applications users can take out the 3100 steel series and replace with the 4100 and 5100 steels. In such items as transmissions and differentials for heavy duty vehicles, no substitution can be recommended, however.

The 4800 series may be satisfactory for some present 3300 applications, according to experts, but no guarantees can be made.

In general, the user may proceed on the theory that where Ford, Chrysler and Buick get along without much nickel, there is hope that a satisfactory substitution can be effected.

Specifications to steel companies should be accompanied by alternatives, it is pointed out. A few large companies already are doing this. One specifies 3100 steel if available, and then gives 4100 as a first choice, 5100 as a second choice and supplies a third choice. Another large user of the 3100 series has decided to embark upon the use of Amola.

The problem is particularly difficult for some small users. One whose whole business is built around the use of four tons of stainless per year, was advised within the past few days to embark immediately upon redesigning. At the same time it was pointed out that well over a year might be required before a successful new part could be developed.

The steel industry, which brought in extensive electric furnace additions during 1940, began cutting down on some uses of nickel several months ago, particularly where extra large amounts of nickel were used in a product.

Export Licensing Again Is Liberalized for U. K.

Washington

• • • **The State Department** early this week instructed collectors of customs to permit exportation to Great Britain and Northern Ireland of virtually all products covered by the export licensing system without requiring individual licenses.

The latest step in effect broadens the blanket arrangement (already covering steel products) to include aluminum, manganese, copper, nickel, cobalt, iron and steel scrap, machine tools and virtually all products which had previously been made subject to the export licensing system. Each product was assigned a general license number, and exporters were instructed to indicate these numbers on the skipper's export declaration.

No Preference Ratings Needed For Air Line Plane Parts

Washington

• • • **Manufacturers of parts** and accessories for aircraft are at liberty to fill contracts to scheduled commercial air lines so long as the execution of military contracts is not impeded. The commercial orders need not be accompanied by preference ratings, the OPM announced.

Competition "Your Problem" CIO Tells Harvester Co.

Chicago

• • • **In reply to a statement** that wage increases would cripple the company in open competition, Farm Equipment Workers Organizing Committee (CIO) told International Harvester Co. officials, "we don't care about your competition. That's your problem." This was brought out in a public statement paid by the Harvester company. A total of 5489 Harvester employees received average 1940 annual incomes of $1,824, the company said.

Monarch Plant Addition to Begin Operation By March 10

Sidney, Ohio

• • • **The new $650,000** addition of Monarch Machine Tool Co., started Jan. 17, will be finished ahead of schedule and operations in the new plant will begin by March 10, it was announced by Wendell E. Whipp, president.

"The new building is already closed in," Mr. Whipp said, "and equipment is now being installed. New men are being employed and trained so that just as rapidly as new machines arrive they can be put into production.

Monarch's plant, Mr. Whipp said, is operating on a two-shift basis of 60 hr. a week.

Sheet & Tube Sales $143 Millions In 1940

Youngstown

• • • **Increases are quite** noticeable in the cost of many items bought by steel companies, Frank Purnell, president, Youngstown Sheet & Tube Co., said in the company's annual pamphlet report.

"Costs of materials such as scrap, fuel oil, coal, ferromanganese and various other supplies have gone up," he said. "Such increases in costs became important in the latter part of 1940 and the costs of the company's requirements of such materials in 1941 will exceed by many million dollars the total amount which the same quantities of the same materials would have cost at 1939 prices."

Mr. Purnell expressed the belief that the present high level of demand for steel products will continue well into the future, stimulated as it is by the defense needs of our government and war needs of other governments.

"It would seem that defense utilization of fabricating and finishing units in other industries, and of man power, will tend to curtail domestic consumption of steel in this country and that the present capacity for steel ingots will be adequate to supply emergency needs for war and defense as well as civilian requirements," he said.

The company reported 1940 net sales volume of $143,054,028 contrasted with $117,027,997 in 1939. Ingot output averaged 82.1 per cent in 1940 against 64.4 per cent in 1939. Net profit for 1940 was $10,815,468 against $5,004,484 in 1939. Taxes accrued in 1940 were $5,497,000 against $4,297,000 in 1939 after giving effect to a non-recurring income tax reduction of about $1,160,000. The company spent $4,594,775 for property acquisitions, plant improvements and betterments.

U. S. Will Fix Scrap Price Differentials

Washington

• • • **Faced with difficulties** among consumers and dealers over differentials based on the government established price of $20 Pittsburgh, for No. 1 heavy melting steel, the Price Stabilization Division of the National Defense Advisory Commission has undertaken the task of fixing differentials both as to grades and geographical locations. To this end the division has sent out schedules to steel mills, foundries and scrap dealers asking for recommendations which must be returned to the division by Saturday of the present week. Unless the schedules are returned by that time the division announced that it will proceed on its own initiative to determine the differentials.

The schedules consist of weekly scrap price averages at all leading centers and for all important grades taken from THE IRON AGE and other sources for two periods. One is for the past six months and the other is for the past six years.

The schedule leaves one column blank in which the consumers and dealers are to make their price recommendations.

Defense Contract Service Coordinators Appointed

Washington

• • • **George C. Brainard,** president of General Fireproofing Co., Youngstown, Ohio, and Raymond C. Force, executive committee chairman of the Caterpillar Tractor Co., San Leandro, Cal., have been designated as district coordinators of OPM's Defense Contract Service, a decentralized information plan established for defense contractors and potential contractors. Mr. Brainard will be coordinator for the Cleveland area while Mr. Force will be coordinator in the San Francisco area.

Magnesium Placed on Mandatory Priority List

Washington

• • • **Acting simultaneously** on Monday, the OPM Priorities Division placed magnesium on the mandatory priority list and the National Defense Advisory Commission Price Stabilization Division established a temporary price ceiling of 11c. a pound on mixed aluminum scrap sold by airplane manufacturers. The OPM previously had placed mandatory priorities on aluminum for civilian use.

The price stabilization division in a telegram to 17 plane manufacturers told them not to sell scrap to dealers at a price above 11c., and said that the price may subsequently be decreased but that it will not be increased so long as the price of virgin aluminum is established at 17c. At the same time scrap dealers were asked not to bid in excess of the price set.

In placing magnesium on the priority list, Director of Priorities Edward R. Stettinius, Jr., asked that defense orders be assigned a preference rating of A-2.

Steel Rate Rise Suspended

Washington

• • • **The Interstate Commerce Commission** has suspended until Oct. 1 railroad schedules proposing to increase carload rates on iron and steel products from points in Illinois and other states to destinations in Iowa and Missouri.

Ore Buckets Hold 23 Tons

Pittsburgh

• • • Blaw-Knox Co. has received an order for four giant ore buckets for a midwest steel plant. Each large bucket will weigh about 44,000 lb. and pick up 23 tons of ore. This is believed to be a larger load capacity than has ever been handled by an ore bucket.

U. S. Acts To Prevent Ford Motor Strike

• • • **Definite steps** by the Federal government and Gov. Murray D. Van Wagoner of Michigan have been taken to ward off a strike by the UAW-CIO against the Ford Motor Co. Conferences were scheduled in Detroit this week by James F. Dewey, Federal Labor Conciliator. Three special mediators named by the governor are: Thomas J. Donahue, Detroit attorney, chairman, the Rev. A. H. Poetker, executive dean of the University of Detroit, and John D. Lynch, Detroit attorney and regent of the University of Michigan. They were appointed after the state attorney-general recommended that because of defense orders, a 30-day waiting period be imposed before the union's strike notice, filed with the State Labor Mediation Board on Feb. 27, becomes effective. The union cannot strike at Ford until 30 days have elapsed.

President, Approving Gano Dunn Report, Says There is no Shortage of Steel

Washington

• • • **The report on steel capacity**, written by Gano Dunn, senior consultant for the Production Division, Office of Production Management, will be regarded by government defense agencies in the months ahead as the "standard" document on the subject. President Roosevelt regards it as the last word on the subject and has asked Mr. Dunn to keep the figures up to date and report back to the White House at three-month intervals.

In making public the report Mr. Roosevelt told his press conference last Friday that a recent White House visitor, a building contractor whom the President did not identify, complained that he had recently attempted to obtain steel for the construction of 150 all-steel houses but that he had been advised that steel supplies were not available because of the defense program.

The President recalled that his visitor had erected a few sample steel houses of four or five rooms each, built to sell for $1800 to $2000 and that the rapidity with which the houses rented indicated to this contractor that there would be considerable public demand for such units.

For steel suppliers to represent that adequate steel was not available for this purpose was either a deliberate lie, the President said, or was prompted by a preference to turn to more profitable business or indicated a reluctance to handle small orders.

Insisting that there is plenty of steel, the President urged all steel consumers to communicate with government officials in Washington if they encounter any difficulty in obtaining steel supplies for ordinary civilian requirements.

In short, the President continued, the Dunn report shows that there is enough steel capacity. Characterizing the results of the survey as exceedingly encouraging, Mr. Roosevelt noted that figures supplied by Mr. Dunn show that with respect to ingots that "capacity is considerably higher than was generally realized."

Salient Facts on Steel Capacity

As of Dec. 31, 1940	
Maximum reliable capacity of the steel producing industry.	87,576,099 tons
If this capacity should be called upon there would be a:	
Surplus in Great Lakes transportation facilities	1.0%
Deficit in blast furnace capacity	2.3%
Deficit in coke capacity	12.2%
Surplus in finishing capacity	15.0%
As of Dec. 31, 1941	
Maximum reliable capacity of the steel producing industry.	91,124,718 tons
If this capacity should be called upon there would be a:	
Deficit in Great Lakes transportation facilities	1.4%
Deficit in blast furnace capacity	1.0%
Deficit in coke capacity	5.9%
Surplus in finishing capacity	11%-15%
Increase of capacity as of Dec. 31, 1941, over capacity as of Dec. 31, 1940	4%

He recalled that there had been considerable loose talk on the question of steel capacity but that the Dunn report, to his mind, represented the last word on the subject and would be so regarded by government defense agencies.

The President said he regarded as minor those sections of the report which estimate on the basis of existing facilities a shortage of 1,130,314 tons in pig iron capacity for operation at "reliable" capacity throughout this year; also the forecast that a coke shortage during 1941 will amount to 5,360,315 tons, or 2,670,906 tons for 1942, was referred to by the President as an incidental factor. Mr. Dunn estimated the total cost of removing these deficits by construction of additional facilities, some of which are already underway, would amount to $59,545,975 in 1941 and $29,482,964 in 1942. Citing the Dunn estimates of 10,100,000-ton excess in ingot-producing capacity during the current year, and 21,100,000 in 1942 if certain measures are undertaken, the President observed that the armament program could be stepped up above the current pace and still leave enough steel.

During his press conference, which related almost exclusively to the subject of steel, Mr. Roosevelt was asked what effect the Dunn report would have on a plan for expansion of the steel industry under the defense program which was submitted to the White House by CIO Chairman Philip Murray. Hesitating, Mr. Roosevelt replied that it all works in together; that it is largely a question of management.

Mr. Roosevelt categorically denied having expressed fears that higher wages in the steel industry would increase prices. He insisted that he saw no reason for concern over current labor controversies in the face of the defense program. He was asked specifically if he had played any part in negotiations concerning the CIO strike affecting Bethlehem Steel Co.'s Lackawanna plant, Mr. Roosevelt replied in the negative, explaining that the extent of his participation had not gone beyond keeping informed of developments.

Gano Dunn Report Sees Need For More Pig Iron and Coke, Steel Capacity Ample

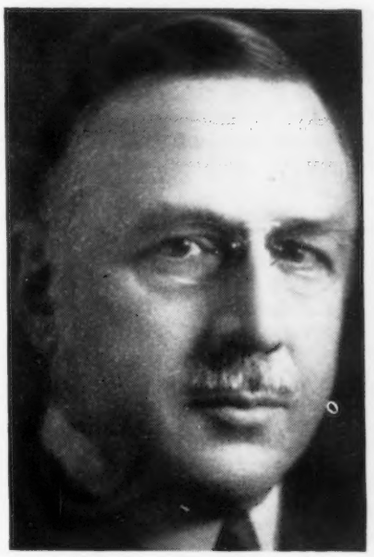
• • • **In an exhaustive survey** of steel making capacity, to determine whether it is sufficient to meet the combined requirements of the United States and British defense programs, plus civilian needs, Gano Dunn concludes that "the rated capacity of the steel in-

dustry is considerably larger than expected, on account of the large amount of new capacity added during 1940 and the large amount of new capacity under construction during 1941, which together was over 6,000,000 tons."

Mr. Dunn stated that he found the method of rating capacity, as employed by the American Iron and Steel Institute, to be sound, but he said that the lost time deduction approximating 10 per cent might be cut down at least one half by shortening the period ordinarily devoted to furnace repairs, thereby giving the industry a "reliable capacity" of 105 per cent of the "practical capacity" figures computed by the institute. If this lost time were shortened only by one fourth, the corresponding capacity would be equal to 102½ per cent of the practical capacity rating and this, he says, "could be relied upon in the national defense."

In support of his contention that a rate of 102½ per cent in steel ingot production could be maintained under emergency conditions, Mr. Dunn presents a letter signed by 10 leading steel operating executives who are members of the committee on manufacturing problems of the American Iron and Steel Institute. These men are: Quincy Bent, vice-president, Bethlehem Steel Co.; J. W. Carter, vice-president, Pittsburgh Steel Co.; Thomas Chalmers, vice-president, Tennessee Coal, Iron & Railroad Co.; C. R. Cox, vice-president, National Tube Co.; Frank H. Fanning, assistant vice-president, American Rolling Mill Co.; W. B. Gillies, vice-president, Youngstown Sheet & Tube Co.; Harvey B. Jordan, vice-president, American Steel & Wire Co.; J. E. Lose, vice-president, Carnegie-Illinois Steel Corp.; S. S. Marshall, Jr., vice-president, Jones & Laughlin Steel Corp.; A. J. McFarland, executive vice-president, Wheeling Steel Corp.; J. S. Pastorius, general works manager, Great Lakes Steel Corp.; Wilfred Sykes, assistant to president, Inland Steel Co.; C. M. White, vice-president, Republic Steel Corp.; J. S. Williamson, general superintendent, Weirton Steel Co.

In their letter to Mr. Dunn this committee stated that the members "were of the opinion that the maximum practical working capacity of the industry, under pressure of demand for all the steel which could be produced, would be 2½ per cent above the rated capacity as customarily calculated." Mr. Dunn says that this opinion is in accord with his own personal experience and judgment as an engineer working in the past in various steel mills.



Gano Dunn

Commenting on the shift from open hearth to bessemer steel making, which has been a gradual process over a long period, Mr. Dunn points out that for many purposes bessemer steel is equally as good as open hearth steel, while in low grade pipe it is superior owing to the ease of threading. Under defense requirements, if it should become necessary to employ the steel industry at its maximum capacity, there would be no difficulty, he says, in shifting a considerable part of the present open hearth production into bessemer. In this connection he points to the flame control development by the Jones & Laughlin Steel Corp., which produces a superior quality of bessemer steel acceptable for many uses hitherto supplied by open hearth. He also stated that an air conditioning process for blast furnaces being developed by this company will increase its pig iron output 8 or 9 per cent.

While the production of ingots is the factor by which the capacity of the steel industry is gaged, Mr. Dunn points out that it is not the sole factor to which attention must be given to achieve maximum production. Evenness of loading with orders through the various companies in the industry is an absolutely necessary condition if, under the stress of national defense, the maximum capacity of the industry is to be attained. If this spreading of orders does not take place voluntarily, without the use of priorities, it is Mr. Dunn's suggestion that it could be accomplished by the Director of Priorities through the allocation or reallocation of orders for steel. Such a measure, Mr. Dunn says, is similar but does not go quite so far as the proposal by Philip Murray, head of the CIO, who suggested an industry council to control such distribution.

Basing his conclusions on the possibility of steel ingot production at 102½ per cent of the institute's practical capacity rating, Mr. Dunn estimates that a "reliable capacity" rating of the industry as of Dec. 31, 1940, was 87,576,099 net tons, while the maximum capacity rating under this formula to be attained by Dec. 31, 1941, is 91,124,718 tons. The report concludes that if certain measures are undertaken there will be an excess of ingot producing capacity over total requirements of 10,100,000 net tons during the present year and 2,100,000 tons in 1942. Measures that must be taken include the elimination of potential bottlenecks in output of pig iron and coke, an even distribution of orders throughout the industry and a shortening of the period of time during which steel making facilities are normally closed down for repair work.

An analysis by Mr. Dunn of all of the various factors entering into the situation are summarized as follows:

IRON ORE. At the normal ratio of 1.71 tons of iron ore per ton of pig iron, there will be required this year a total of 98,853,987 net tons of iron ore, to which is added 1,000,000 tons of ore for the production of ferroalloys, making a total ore requirement for all purposes of 99,853,978 net tons. Assurance that transportation facilities by boat and rail will be suffi-

cient for the handling of this large amount of ore has been received by Mr. Dunn from the Lake Superior Iron Ore Association and J. J. Pelley, president of the American Association of Railroads. Ore received from Chile, Cuba, Canada and Brazil will total about 2,375,000 tons, leaving about 97,478,978 tons to be received from domestic sources, of which the Great Lakes area would be expected to supply 81,578,978 tons and other domestic sources, such as Alabama, a total of 15,900,000 tons. He says that it seems reasonable to estimate that as much as 84,000,000 tons can be moved down the Great Lakes from Lake Superior mines, for which he reports the mine capacity of that region is more than ample.

There will be required during 1941 about 1,608,768 tons to make 940,800 tons of pig iron required for export to Great Britain. This brings the total ore required from the Great Lakes area to 83,187,746 tons. In an adjoining table on ore requirements, the amount of surplus of Great Lakes transportation facilities is given as 2,421,022 tons, but the British requirements reduce the surplus of Lake transportation facilities to 812,254 tons. This leaves a Lake transportation surplus of only 1 per cent.

PIG IRON. Total blast furnace capacity as of Dec. 31, 1940, was 57,609,590 net tons, a gain of 4 per cent over the capacity computed as of Dec. 31, 1939, amounting to 55,723,640 tons. Deducting 9,200,000 tons of pig iron as the amount necessary to supply iron foundries and a reserve for the production of ferroalloys, the amount of pig iron capacity available for the production of steel is given as 48,409,590 tons. As there is a loss of about 10 per cent in the ingredients used in the manufacture of steel, it is assumed that a gross charge of 96,333,708 tons of furnace material would be required to produce 87,576,099 tons of steel ingots, the figure used by Mr. Dunn as the maximum reliable capacity of the steel industry. Further assuming a charge of 50 per cent pig iron and 50 per cent scrap in the open hearth process, 90 per cent pig iron and 10 per cent charge in the bessemer process and 5 per cent pig iron and 95 per cent scrap in the electric furnace process, and basing his calculations on open hearth capacity of 88.3 per cent of the total, bessemer 8.2 per cent and electric 3.5 per cent, Mr. Dunn estimates that the amount of pig iron in a gross charge of 96,333,708 tons would be 49,809,344 tons. This suggests a deficit in blast furnace capacity of 1,399,754 tons at normal rating. This deficit is based on the proportions of pig iron and scrap as above given and on the practical capacity figures of the American Iron and Steel Institute.

However, Mr. Dunn calculates that in pig iron as well as in steel it is possible to produce at 102½ per cent of normal rating, which would thus give what he calls a "reliable rating" of 49,619,830 tons. Comparing this with the capacity required to produce maximum output of ingots, the deficit is reduced to only 189,514 tons. This deficit has been calculated without taking into account a requirement of pig iron during 1941 for export to Great Britain of 940,800 tons. "While this is a demand for pig iron as distinguished from steel," he comments, "it makes a drain on the blast furnace capacity of the steel industry and augments the above deficit in blast furnace capacity from 189,514 tons to 1,130,314 tons." This deficit, equal to 2.3 per cent, could be remedied by new construction, which it is estimated would cost $10 a ton or a total of $11,303,140.

COKE. Along with any increase in blast furnace capacity there must be a parallel increase in the production of coke. As of Dec. 31, 1940, the capacity for making coke applicable to blast furnaces was 47,395,812 tons, but not all of this capacity goes for making coke used for the making of steel, some of it going to blast furnaces that make ferroalloys or supply pig iron to foundries. The amount that will thus be used this year is estimated at 8,096,000 tons, leaving available for blast furnaces serving steel plants a total of 39,299,812 tons. Calculating 0.88 ton of coke per ton of pig iron, the amount of coke required to make 49,809,344 tons of steel making pig iron would be 43,832,223 tons, leaving a potential bottleneck of 4,532,411 tons or 10.3 per cent.

"It is essential," says Mr. Dunn, "that this bottleneck be removed." A voluntary assumption on the part of the industry of the necessary expansion to remove this bottleneck may be expected, says Mr. Dunn. Such expansion, he suggests, might be pro-rated among the companies in proportion to their need of coke. The capital cost of coke oven capacity he gives as $9 a ton, which would require an investment of $40,791,699 to remove the bottleneck. If it is not removed, it will act as a limitation on the ability of the industry to produce steel, of which the capital cost to construct new capacity is given as $125 a ton. New construc-

Iron Ore

Tabulation of Transportation Capacity as of Dec. 31, 1941

	Tons per Annum
Pig iron for maximum reliable industry capacity of 91,124,718 tons of steel	51,486,834
Pig iron for iron foundries (Trend has been downward, therefore no increase over Dec. 31, 1940)	8,000,000
Total	59,486,834
Ore required to make one ton of pig iron	1.71
Ore required for steel production and iron foundries	101,722,486
Ore required for ferroalloys (increase in ferroalloys provided by increase in manganese ore)	1,000,000
Total ore requirements	102,722,486
From sources as follows:	
Ore from Chile, Cuba, Canada and Brazil	2,375,000
Leaving ore from domestic sources	100,347,486
Ore from Alabama and other States	15,900,000
Leaving ore required from Great Lakes	84,447,486
Capacity of Great Lakes transportation facilities	84,862,400
Surplus in Great Lakes transportation facilities as of December 31, 1941	414,914

The above figure represents at first instance a surplus of ½ of 1%.

tion now underway or authorized will considerably diminish this threatened shortage, it is stated. The amount of new capacity authorized as of Feb. 10, 1941, totaled 5,775,600 tons.

If before this new capacity is completed, there should be a serious shortage of coke, the large amount of coke capacity currently supplying the requirements of commercial and domestic heating could, by use of priorities, be drawn upon to make good the deficit until new coke capacity came into operation. The place of coke diverted from domestic heating could be taken by coal and other fuels. In the coke capacity figures no calculation has been made for an estimated 827,904 tons required to produce 940,800 tons of pig iron for the British. Adding this figure, the potential deficit becomes 5,360,315 tons, or 12.2 per cent, which would require a capital cost of $48,242,835 to remove.

SCRAP. "The supply of scrap has been investigated," Mr. Dunn reports, "and found to be so dependent upon the price of scrap, transportation and other fluctuating factors difficult to determine, that a definite indication of the amount of scrap available is not possible, but it is the opinion of some of the best experts in the industry that, provided the price is met, there will be no bottleneck in the scrap supply." It is pointed out that if blast furnace capacity should at any time during the emergency be found to be inadequate for the maximum production of steel the deficit in pig iron could be met upon an increased supply of scrap. This would involve changing the proportions of pig iron and scrap in the steel charge. On the basis of the proportions previously cited (50-50 for open hearth charges, for example) the amount of scrap that would be required for maximum steel output is calculated at 46,524,364 tons. An increase to 46,713,878 tons could make up for the calculated deficit in pig iron. Of the total scrap required, 26,272,830 tons would be provided by "home scrap," the scrap produced by the steel plants themselves in the process of steel manufacture. The remainder, 20,441,048 tons, would represent the total demand on outside sources.

It is pointed out that in 1937, a year of high steel output, the scrap industry sold to the steel industry and for export a total of 18,200,000 tons. "It is therefore obvious," Mr. Dunn comments, "that the increased scrap that would be demanded by an increase in steel production to maximum industry capacity of 87,576,099 tons, and by the disturbance of the usual proportions of pig iron to scrap temporarily created by the deficit in blast furnace capacity, would not represent a problem difficult to solve, especially with scrap markets curtailed. The industrial history of the country has shown that in any period of high production scrap becomes available as a result of that high production."

Pig Iron

As of Dec. 31, 1941

	Tons per Annum
Available capacity at reliable rating as of Dec. 31, 1940	49,619,830
Additions at reliable rating during 1941	2,263,323
Blast furnace capacity at reliable rating as of Dec. 31, 1941	51,883,153
Blast furnace capacity required if maximum reliable industry capacity as of Dec. 31, 1941, amounting to 91,124,718 tons is to be attained	51,486,834
Surplus at reliable rating in blast furnace capacity as of Dec. 31, 1941	396,319

The above figure represents a first instance surplus in blast furnace capacity equal to ¾ of 1%.

Coke

As of Dec. 31, 1941

	Tons per Annum
Coke capacity available as of Dec. 31, 1940	39,299,812
Coke capacity to be added during 1941	4,165,600
Coke capacity available as of Dec. 31, 1941	43,465,412
Coke capacity required if maximum reliable industry capacity of 91,124,718 tons as of Dec. 31, 1941, is to be attained	45,308,414
Deficit in coke capacity as of Dec. 31, 1941	1,843,002

FINISHING CAPACITY. Mr. Dunn estimates the average surplus of steel finishing capacity at steel mills to be about 15 per cent. While in certain local exceptions, as mentioned by Philip Murray of the CIO, there may be surpluses of as much as 50 per cent, this apparently is not true of the industry as a whole. Mr. Dunn reports that he has satisfied himself that, if the deficits in blast furnace and coke capacity are removed, the capacity of other facilities, including transportation, leading up to the production of ingots, and the capacity of the facilities leading down from ingots to finished products, will be "in substantially harmonious economic relation to the ingot capacity itself."

STEEL CASTINGS CAPACITY. There is a considerable amount of steel castings capacity which is not included in the figures for the primary steel industry, Mr. Dunn reports. He quotes figures furnished by Col. M. G. Baker, executive secretary of the Steel Founders Society of America, giving the total steel castings capacity of the United States as 1,320,000 tons, of which 900,000 tons is open hearth and 420,000 tons electric furnace. Since these castings enter into Army and Navy consumption for tank armor, demolition bombs and numerous other items and into general civilian consumption, the capacity to produce them, he says, "constitutes a legitimate part of the capacity of the steel industry." He explains that it has not been customary to include these steel castings in reports of industry capacity, and therefore he has not included them in his industry totals, but he calls attention to the fact that "they should be added when the time comes to totalize the industry."

CAPACITY OF 10 LEADING COMPANIES. Mr. Dunn gives the capacities of 10 leading steel companies and their operations during the last half of 1940. Such information has never before been given out, it is stated, but the companies have given Mr. Dunn permission to use it in his report. He calls attention to the figures as showing that several of the companies, which are not yet pressing their capacities to the limit, have

been running open hearth production well over the "reliable capacity" of 102½ per cent of normal ratings. He comments on the fact that in no full year has the output of the steel industry attained its rated capacity, not even in 1916 when both backlogs and prices were at unprecedented levels.

NATIONAL DEFENSE REQUIREMENTS. While accepting, in part at least, some of the estimates of government economists as to the amount of steel that shall be required during this emergency, Mr. Dunn still contends that there will be ample steel for all purposes, assuming, of course, that potential bottlenecks, such as outlined in blast furnace and coke capacity, are removed. He leans principally on the report prepared by Melvin G. de Chazeau, formerly professor of economics of the University of Virginia, who, while attached to the Industrial Materials Division of the Advisory Commission of the Council of National Defense, did this work. Mr. de Chazeau is a joint author of "The Economics of the Iron and Steel Industry," he has served the Department of Justice as an adviser in matters affecting the steel industry and testified in the investigation of the steel industry by the Temporary National Economic Committee, which activities, Mr. Dunn says, "peculiarly qualified him for this report." Mr. de Chazeau is now attached to the Production Division of the Office of Production Management.

Mr. de Chazeau's report was prepared for the purpose of "shedding light between those who held that in the interest of national defense the capacity of the steel industry should be expanded beyond the expansions then under way and those who held the contrary view." While Mr. Dunn accepts Mr. de Chazeau's figures on anticipated civilian consumption and many other estimates "which are in the field of his profession," he declines to accept his estimates of the capacity of the steel industry. "He did not have the advantage which I have had," says Mr. Dunn, "of thorough investigation of that capacity."

Steel requirements are discussed in the Dunn report under three headings: 1. Army and Navy requirements; 2. British and other export requirements; 3. Civilian requirements.

Scrap

As of Dec. 31, 1941

	Tons per Annum
Gross charge of furnace material for 91,124,718 tons of steel, maximum reliable industry capacity as of Dec. 31, 1941	100,237,190
Pig iron portion of above charge	51,486,834
Leaving scrap portion of above charge	48,750,356
Home scrap produced when producing the above 91,124,718 tons of steel ingots (30% of ingots)	27,337,415
Leaving purchased scrap to be supplied from scrap markets	21,412,941

British export requirements include 84,000 tons of scrap per month or 1,008,000 tons of scrap per annum during 1942. Adding this amount to the figure above given for scrap to be supplied from scrap markets amounting to 21,412,941 tons, increases it to 22,420,941 tons per annum.

Under the head of direct defense needs, Mr. de Chazeau had estimated in terms of ingots the Army and Navy requirements for the fiscal year ending June 30, 1941, as 2,800,000 tons and for the fiscal year ending June 30, 1942. 4,100,000 tons. Mr. Dunn checked these figures with Robert R. Nathan of the Bureau of Research and Statistics of the National Defense Commission, who confirmed them as correct. However, based on present appropriations and plans, Mr. de Chazeau is of the opinion that these estimates are likely to prove too low, and with this Mr. Dunn concurs.

With respect to British requirements, Mr. Dunn has consulted with Secretary of the Treasury Morgenthau, and his director of research and statistics, George C. Haas, also his assistant, Philip Young; also with Acting Secretary of the Treasury Herbert E. Gaston. He has received direct information from the British Iron & Steel Corp., the British buying agency for steel in this country, and he has had access to a letter from Sir Charles Wright, Iron and Steel Controller of the British Ministry of Supply. In estimating the amount of direct steel exports to Britain he has used the figures of the British Iron & Steel Corp., while in estimating the amount of steel required for manufactured goods to be supplied to Great Britain he has used the figures of the Secretary of the Treasury.

While there is a great deal of detail in the report regarding the probable British requirements, the summation is that in 1941 Britain will require a total of 9,640,000 tons and 10,534,000 tons in 1942. Canada will require 1,800,000 tons this year and 2,000,000 tons next year, while exports to all other countries will total 2,000,000 tons this year and a like amount next year. Thus the estimated export total for this year is 13,440,000 tons and for next year 14,534,000 tons.

British exports are divided as follows:

	Net Tons 1941	1942
Commercial steel	7,111,000	7,111,000
Manufactured goods		
Ships	540,000	540,000
Aircraft	122,000	225,000
Tanks	234,000	137,000
Ordnance	182 000	38,000
Ammunition	918,000	1,850,000
Machine tools	33,000	33,000
Surplus to offset possible under-estimation	500,000	600,000
Total British exports	9,640,000	10,534,000

Although Mr. Dunn's estimates are for calendar years and those of Mr. de Chazeau for fiscal years, they are said to be in fairly substantial agreement.

It is in the field of civilian requirements under the emergency that there has been wide difference of opinion. Estimates of civilian steel requirements even higher than those of the de Chazeau report are given in a report which Mr. Dunn mentions which was prepared by Harold H. Wein under the direction of V. Lewis Bassie, chief of the Civilian Requirements Division of the Bureau of Research and Statistics of the National Defense Commission. Where Mr. de Chazeau finds a total of 61,000,000 tons for the fiscal year 1941 and a total of 70,000,000 tons for the fiscal year 1942, Mr. Wein finds a total of 62,600,000 tons for the fiscal year 1941 and a total of 74,600,000 tons for the fiscal year 1942. These are the only figures which have come to his attention, says Mr. Dunn, which are higher than the de Chazeau figures. Mr. Dunn has taken

Mr. de Chazeau's figures, which are next to the highest, "because he represents the point of view of the government economists generally."

Accepting the de Chazeau figures, Mr. Dunn contends there will be no shortage of steel capacity in either 1941 or 1942, subject to the elimination of potential bottlenecks in pig iron and coke, but a surplus of not less than 10,086,099 tons in 1941 and not less than 2,140,718 tons in 1942. "To the extent that the actual demands do not reach maximum capacity but leave a surplus," he comments, "the blast furnace and coke capacity deficits will be reduced or fail entirely to appear." His conclusions on this point are summarized in an accompanying table headed, "Salient Facts on Steel Capacity."

INVENTORY BUYING. Mr. Dunn concludes that there has undoubtedly been a great deal of inventory buying of steel. How great this has been it has been impossible to determine. He cites an effort made by the Federal Reserve Bank to disclose the true situation in which the result was so indefinite as to be unsatisfactory. While he argues that a certain amount of increased inventory of finished steel is essential to increased business, he believes that a considerable part of such "hoarding" has resulted from fear of congestion in the steel industry. Such inventory increases for hoarding will fall off, in his belief, if confidence is built up that the steel industry can produce all necessary requirements. He has examined the backlogs of orders now on the books of the steel companies and finds them to be high. But the amount of the backlogs does not, he contends, represent desire for immediate delivery but for definiteness of delivery on the date when the future requirements are needed. "If the whole present backlog of the industry should be immediately delivered, it would seriously embarrass the purchasers," he says.

While nowhere in his report does Mr. Dunn suggest the possibility that consumption of steel for civilian requirements might be curtailed by the imposition of mandatory priorities, he does point out that the estimates of civilian requirements would be considerably reduced, if, for example, bottlenecks in machine tools or labor supply should prevent the attainment of national incomes of 80 billions of dollars in fiscal 1941 and 90 billions in fiscal 1942. Taking the de Chazeau figures at full value, he calculates steel requirements for the fiscal year 1942 as 89,000,000 tons against a "reliable capacity" figure of 91,100,000 tons, leaving an estimated surplus of 2,100,000 tons.

To build the 8,000,000 tons of additional steel making capacity, which, on the basis of reports by government economists it would be necessary to build in order to have "ample capacity," would cost $1,000,000,000, Mr. Dunn declares, estimating the cost of such construction at $125 a ton.

U.S. Urges Sale Of Idle Machine Tools

Washington

• • • **Government officials** last week urged non-defense manufacturers to sell idle machine tools to holders of defense contracts, announcing that with the order fixing maximum prices for second-hand machine tools now effective both dealers and manufacturers must comply with its provisions in disposing of surplus tools.

Leon Henderson, head of the price stabilization division whose offices have been moved to 2000 Massachusetts Avenue, said that price schedules have been sent to more than 550 dealers in second-hand machine tools and that dealers are now listing stocks on hand and prices at which they are being offered, preliminary to reporting to the price stabilization division on or before April 10. An owner who tries to dispose of machine tools at prices above the maximum will violate the order (effective March 1) whether the sale is made to a dealer or direct to a user, Mr. Henderson said.

Mason Britton, chief of the OPM's machine tool section, said it is well known that large numbers of idle machine tools are available. He reported that the defense demand is greatest for boring mills, planers, radial drills, lathes and milling machines, particularly machine tools of the heavier type.

(*How Chicago machine tool dealers regard the new price ceilings—Page* 126.)

1940 Scrap Exports 20% Below Those of 1939

Scrap Exports—January-October, 1940
(Gross Tons)

	United Kingdom	Canada	Japan	Italy	Total, Incl. All Others
January	32,907	7,761	108,718	31,692	187,457
February	56,162	5,367	101,619	49,636	234,716
March	73,937	6,734	41,883	48,258	206,928
April	77,160	20,710	38,421	74,459	221,152
May	63,919	49,392	67,429	98,652	312,483
June	155,364	55,362	56,946	18,226	318,369
July	140,365	57,104	114,076	.....	327,129
August	145,892	55,117	137,640	.....	355,991
September	79,360	22,298	148,332	.....	255,608
October	55,098	44,205	147,708	.....	258,926
November	33,971	35,709	.....	.....	74,349
December	55,290	9,933	.....	.....	68,135
Total	969,425	380,883	963,519	320,923	2,823,088

Scrap Exports in 1939
(Gross Tons)

	United Kingdom	Canada	Japan	Italy	Germany	Poland	Total, Incl. All Others
Jan.	.....	4,100	154,503	26,055	11,635	2,598	227,073
Feb.	.....	2,183	170,534	24,840	2,615	3,827	223,509
Mar.	2,307	7,576	201,384	69,540	115	6,296	311,089
April	10,736	6,679	135,659	55,739	2,194	2,498	240,124
May	60,798	11,754	198,696	48,007	.....	26,562	384,881
June	80,560	37,489	178,462	50,662	25	29,615	398,898
July	99,833	15,702	122,273	50,170	.....	37,044	340,066
Aug.	79,659	9,519	131,484	23,103	.....	.....	291,896
Sept.	85,527	18,914	178,826	29,452	.....	8,919	330,680
Oct.	38,563	26,362	248,936	7,037	.....	.....	336,775
Nov.	30,960	23,108	181,014	11,252	.....	.....	272,656
Dec.	19,350	12,054	125,064	30,039	.....	.....	206,402
Total	508,293	175,450	2,026,825	425,896	16,584	117,359	3,564,039

The above table was incorrectly printed in the issue of Jan. 2, 1941.

Source: Metals and Minerals Division, Bureau of Foreign and Domestic Commerce.

• **Howard P. DeVilbiss,** grandson of the founder of the DeVilbiss Co., Toledo, and **Roy A. Guyer,** sales manager of the spray painting equipment division, who has been with the company for 29 years, are newly elected vice-presidents of the company.

• • • **Ernest J. Poole, Jr.,** general superintendent of Carpenter Steel Co., Reading, Pa., has been named vice-president in charge of manufacture, and **Frank R. Palmer,** assistant to the president, has been appointed vice-president in charge of sales.

Mr. Poole, son of the late E. J. Poole, Sr., former vice-president and general manager of Carpenter Steel, served as superintendent of maintenance until November, 1937, when he was appointed acting general superintendent. He is a graduate of U. S. Naval Academy.

Mr. Palmer, a graduate of the University of Pennsylvania in chemical engineering, has been associated with Carpenter Steel since 1917. He first served as foreman of the electric furnace melting department and later with the metallurgical department. He has been awarded a number of patents covering free-machining stainless steels and these were assigned to Carpenter Steel Co.

Personals

Change is inevitable in progressive Industry. Change is constant.

• **A. Maxwell Jones,** formerly general sales manager of the Buffalo Bolt Co., Buffalo, has been elected vice-president in charge of sales. He has been associated with the company since 1902. He has served in many different departments of the company, starting in the North Tonawanda plant, later going to the Chicago office as a junior salesman. From Chicago he went to St. Louis as district manager. Mr. Jones returned to the main office as assistant sales manager in 1925, and was named general sales manager in 1936.

• **E. H. Weigman,** who was appointed sales manager for the Grip Nut Co. on Jan. 1, has now been elected vice-president in charge of sales, with headquarters in Chicago. **Erastus Emery** has been appointed Eastern district sales manager, with headquarters at Pittsburgh. **John D. Ristine** is now assistant to the president, with headquarters at Chicago.

• **William F. O'Brien,** formerly a consultant at Chicago, has been named personnel manager of Columbus division of the Curtiss-Wright Corp. **Leo Uridil,** who has temporarily filled this position, becomes Mr. O'Brien's first assistant.

• **Dr. Tracy C. Jarrett,** formerly assistant metallurgist, American Optical Co., has been appointed chief metallurgist for Koppers Co., American Hammered Piston Ring division, Baltimore. Dr. Jarrett was graduated from South Dakota School of Mines in 1932; received his Master of Science degree from Harvard Engineering School in 1933; and his degree as Doctor of Science in Metallurgy from Harvard in 1936. During 1931 and 1932 he was a laboratory instructor in metallurgy at the South Dakota School of Mines and was an instructor in metallurgy at Harvard as assistant to the late

ERNEST J. POOLE, JR., vice-president in charge of manufacture, Carpenter Steel Co.

FRANK R. PALMER, vice-president in charge of sales of Carpenter Steel.

TRACY C. JARRETT, chief metallurgist for American Hammered Piston Ring division of Koppers Co.

Prof. Albert Sauveur. Dr. Jarrett, a member of the American Society of Metals and the American Institute of Mining and Metallurgical Engineers, is the inventor of the Jarrett metallurgical polishing and lapping machine.

• **E. F. Billin,** of Page Steel & Wire division of American Chain & Cable Co., Inc., Monessen, Pa., was elected secretary of Page Fence Association at the annual meeting of the association which was held on January 28, 29 and 30 at the Hotel Fontanelli, Omaha, Neb.

• **Addison C. Armstrong** has joined the Worthington Pump & Machinery Corp.'s organization at its Holyoke, Mass., works, as manager of the ordnance division. He will be directly in charge of the production of ordnance equipment at that plant. Mr. Armstrong was formerly affiliated with the Truscon Steel Co. as a departmental manager. Previous to that he was associated with the Bartlett-Hayward Co. and the Campbell Metal Window Corp.

• **Leroy Evans,** LaSalle Steel Co. advertising manager, has become a member of the personal staff of **T. L. Kelly,** executive vice-president. Mr. Evans will operate out of the executive offices in Chicago and his new duties are in addition to those in his regular capacity as advertising manager.

• **A. W. Steudel,** president, Sherwin-Williams Co.; **J. M. Price,** president, Ferro Machine & Foundry Co.; **H. W. Kranz,** president, Cleveland Welding Co.; **F. E. Davis,** Sherwin-Williams Co.; **H. D. Harsh,** treasurer and general manager, Harsh Bronze & Foundry Co.; **E. H. Hughes;** and **Dave R. Jones,** president of Geometric Stamping Co. have been made directors of the Geometric Stamping Co., Cleveland.

• **F. H. Lindus,** formerly Los Angeles branch manager of Timken Roller Bearing Co., Canton, Ohio, has been transferred to the home office, where he will be engaged in general sales promotional work. **L. J. Halderman,** branch manager of the service-sales division of the Chicago office, has taken Mr. Lindus' place in Los Angeles, and **Jack Gelomb,** formerly holding a similar post in the Detroit office, has filled the vacancy in the Chicago office. **Joe Jesseph,** resident salesman in the Portland branch, goes to Detroit as manager.

E. F. BILLIN, new secretary of Page Fence Association.

• **A. W. Doran** has been assigned to special duties in connection with railroad and governmental sales by the B. F. Goodrich Co., Akron, Ohio. **B. E. Silver,** heretofore sales representative of the mechanical division in Indiana, has been transferred to government sales in Washington, and **W. E. Nees** has been transferred to Indianapolis. **Ralph Barcus,** of the Akron district staff, succeeds Mr. Nees in the West Virginia territory, with headquarters in Charleston.

• **J. H. Bell** has been appointed executive vice-president of the Cardox Corp., Chicago. He is also in charge of mining activities. **Eric Geertz** has been made vice-president in charge of the fire division, and **Harry Ensminger** has been appointed general sales manager of the same division. **Lawrence E. Lawson** has been promoted to vice-president of the carbon dioxide gas division, and **Dr. C. A. Getz,** director of research.

• **B. A. Nagelvoort,** who has been identified with the Renown Stove Co., Owosso, Mich., since 1932, has been elected president, succeeding **J. E. Ellis,** who resigned in November. Mr. Nagelvoort has been general manager since 1936.

• **John E. Fearon,** heretofore in charge of the flow meter sales section of the appliance division of the Cochrane Corp., Philadelphia, has joined the Boiler Equipment Service Co., Atlanta, as a member of the firm.

• **Thomas T. Allison, Jr.,** has been appointed assistant superintendent of blast furnaces, Woodward Iron Co., Birmingham. He has been employed in the company's blast furnace division for the past four years.

• **J. C. Merwin,** former treasurer, has been elected president of the Chain Belt Co., Milwaukee, to succeed the late C. R. Messinger, who died Feb. 4. **G. M. Dyke,** former assistant treasurer, was elected treasurer, and **A. F. Kessler** of the treasury department, was made comptroller. A graduate of Sheffield Scientific school, Yale university, Mr. Merwin began his career as an apprentice tool maker with the Geometric Tool Co., New Haven, Conn. He was assistant superintendent of the National Blank Book Co., Holyoke, Mass., before joining Chain Belt in 1917, where he was elected a director in 1923 and was made vice-president in 1924. The office of treasurer was added to his title in 1939. Mr. Dyke has been with Chain Belt since 1923 and in 1926 became vice-president of the Stearns Conveyor Co. when it was acquired by Chain Belt. He returned to Milwaukee in 1929 when the Stearns operations were moved there and was made assistant treasurer of Chain Belt. Mr. Kessler joined Chain Belt in 1923 and was chief accountant until 1938 when he was appointed assistant treasurer.

• **C. I. MacGuffie,** for the past year assistant to **L. D. Meeker,** manager of electric welding sales, General Electric Co., Schenectady, N. Y., has been made manager of sales, electric welding section. Mr. Meeker has resigned to become associated with the Smith-Meeker Engineering Co., New York, after having been identified with General Electric since 1923. Mr. MacGuffie joined General Electric in 1925 after his graduation from Pennsylvania State College. He was transferred to the Philadelphia office three years later to handle welding sales. In 1929 Mr. MacGuffie was made welding specialist of the Atlantic district and left Philadelphia for Schenectady

in 1939 to become assistant to Mr. Meeker.

• **Clinton E. Swift,** heretofore welding superintendent at the Young Radiator Co., plant, has joined the Weldrod division of Ampco Metal, Inc., Milwaukee, to head the development, production and distribution of Ampco-Trode. He has been associated with the welding industry since his graduation from the college of engineering of the University of Illinois. He was formerly associated with Westinghouse Electric & Mfg. Co. and American Brass Co.

• **T. P. Samuels** has been transferred from the Milwaukee office of Ampco to the Pacific Coast territory and will work under the supervision of **O. D. Cooper,** Burbank, Cal.

• **John K. Travis,** heretofore Birmingham representative of Hickman Williams & Co., Cincinnati, has resigned to become Birmingham representative of the Philip W. Frieder Co., Cleveland. Hickman Williams & Co. are maintaining an office in Birmingham but a representative in that city has not yet been named.

• **Andrew H. Knight,** Birmingham attorney, has been appointed executive assistant in the Tennessee Coal, Iron & Railroad Co., Birmingham, a newly-created position. Mr. Knight is a graduate of Harvard University Law School.

• **John Payton** has been appointed district manager for the Indiana and east central Illinois territory of Reznor Mfg. Co., Mercer, Pa. He will make his headquarters at Indianapolis.

• **Howard Gould,** of the David J. Joseph Co., Cincinnati, has been appointed chairman of the uniform contract committee of the Institute of Scrap Iron and Steel. **Max Meltzer,** of the Steel Trading Corp., Pittsburgh, has been made chairman of the resolutions committee, and **Charles R. Ritter,** of Luria Brothers & Co., Philadelphia, has been made chairman of the traffic committee.

• **A. A. Dahms,** for many years identified with the Chicago office of the Allis-Chalmers Mfg. Co., Milwaukee, has been made manager of the Davenport, Iowa, branch office. He will be assisted by **E. A. Rensch** and **C. J. Schutty.**

Obituary

THE LATE R. D. Mackenzie, Cleveland district sales manager of Youngstown Sheet & Tube Co.

• **R. D. Mackenzie** since 1930 district sales manager at Cleveland for Youngstown Sheet & Tube Co., died suddenly at his home on Feb. 22, following a heart attack. He had been in the steel business for over 27 years and was widely known in northern Ohio. Born in Cleveland Mr. Mackenzie started as a salesman with the Gary Iron & Steel Co. at Cleveland and was with Brier Hill Steel Co. when it was merged with Sheet & Tube. In 1926 Mr. Mackenzie served the Buffalo territory and then returned to Cleveland.

• **George Klenk,** head of the brass foundry at the Allis-Chalmers Mfg. Co., Milwaukee, for 49 years, died of a heart attack Feb. 14 in his home at Milwaukee. He was a native of Milwaukee and at the age of 13 began his apprenticeship with the Loeffelholz & Prier Brass Founders and Finishers. After four years he went to Chicago where he worked with several foundries, later returning to Milwaukee. When the old E. P. Allis Co. decided to establish its own brass foundry, Mr. Klenk was made superintendent and when the firm became part of Allis-Chalmers he went with it. He was an expert on non-ferrous metals and was the originator of methods of molding cast blading for turbines. He was 76 years old.

• **Frank J. Holderried,** vice-president and treasurer of the Roberts Iron Works, Inc., and of the Hodge Boiler Works for many years before he went into business for himself in 1932 under the firm name of Kendall Boiler & Tank Co., Cambridge, died at a Newton Center, Mass., hospital Feb. 20. He was 74 years old.

• **Charles P. Renfrew,** a former member of the Boston steel firm of A. Milne & Co., died at his home in Dorchester, Mass., on Feb. 18, aged 92 years.

• **Guernsey A. Palmer,** district manager for Baldwin De La Vergne Sales Corp. and Baldwin Southwark division of the Baldwin Locomotive Works in Houston, Tex., died suddenly at his home there on Feb. 8, aged 55 years. A graduate of Massachusetts Institute of Technology, Mr. Palmer received his M. E. degree in 1915. He has been continuously associated with De La Vergne since March 1, 1916. In 1917 he was made manager of the Houston office, later holding the same position for Baldwin Southwark as well.

• **Charles J. Thistlethwaite,** secretary of Ontario Drill Co., East Rochester, N. Y., since its organization in 1900, died at his home in Rochester after a long illness, aged 73 years. Born in Macedon, N. Y., he became associated with The Bickford & Huffman Co., of Macedon, pioneer manufacturers of grain drills, and left that company in 1900 to become one of the organizers of Ontario Drill Co.

• **Alphonse S. Campbell,** founder and former president of the A. S. Campbell Co., Boston, died last week en route to Rio de Janeiro. He served as president of the company, one of the largest metal stamping concerns in the East producing accessories for automobile manufacturers, until last fall, when he retired to become chairman of the board. During the past 15 years he had been closely identified with the company's Detroit office, Mr. Campbell was a native of Boothbay Harbor, Maine.

Pig Iron Output in February Drops Slightly

Production of coke pig iron in February totaled 4,197,872 net tons, compared with 4,663,695 tons in January. Daily output in February dropped slightly from that in the previous month, or from 150,441 tons to 149,924 tons in February. The operating rate for the industry, based on the capacity as of Dec. 31, 1940, of 157,542 net tons a day, was 95.2 per cent, against a revised figure of 95.5 per cent for January.

Operating Rate at 95.2% of New Capacity, as of Dec. 31, 1940. Daily Output 0.3% Off from January

There were 202 furnaces in blast on March 1, operating at the rate of 148,555 tons a day, compared with 205 on Feb. 1, making 152,040 tons. The United States Steel Corp. took one furnace off blast, independent producers took two off and blew in one furnace, and one merchant furnace was blown out.

The furnace blown in was the recently rebuilt Steelton E, Bethlehem Steel Co.

Among the furnaces blown out or banked were: Lackawanna A, and Cambria K, Bethlehem Steel Co.; Ohio No. 6, Carnegie-Illinois Steel Corp., and Anna, Struthers Iron & Steel Co.

Production by Districts and Coke Furnaces in Blast (In Net Tons)

					March 1, 1941		Feb. 1, 1941	
FURNACES	Feb., 1941	Daily % of Capacity	Jan., 1941	Feb., 1940	No. in Blast	Operating Rate Net Tons a Day	No. in Blast	Operating Rate Net Tons a Day
Eastern	32,459	98.2	38,014	.....	2	1,160	2	1,225
Buffalo	238,396	86.8	284,661	213,434	11	7,850	12	9,185
Philadelphia	366,755	98.0	394,080	342,917	17	13,310	16	12,585
Ferro. and Spiegel	16,884	113.0	18,741	17,560	4	605	4	605
Pittsburgh	1,001,000	94.0	1,128,690	872,799	47	35,750	48	36,775
Ferro. and Spiegel	25,297	64.6	26,161	29,778	3	905	3	845
South Ohio River	89,284	90.7	102,345	71,167	7	3,190	7	3,300
Valleys	520,356	98.7	589,143	266,101	22	17,660	24	19,495
Wheeling	198,878	107.0	220,622	141,587	9	7,105	9	7,115
Cleveland	342,942	93.0	394,821	261,465	16	12,250	16	12,735
Chicago	889,577	93.0	953,101	674,396	36	31,770	36	31,195
St. Louis	.....	...	.....	.....	0	.....	0	.....
Detroit	105,664	100.7	119,801	103,350	5	3,775	5	3,865
Western	62,069	109.3	72,035	55,136	4	2,215	4	2,325
Southern	306,242	113.0	319,111	259,180	18	10,935	18	10,715
Ferromanganese	2,069	25.0	2,369	2,610	1	75	1	75
Total	4,197,872	95.2	4,663,695	3,311,480	202	148,555	205	152,040

Production of Coke Pig Iron and Ferromanganese

	Pig Iron*		Ferro-Mn†	
	1941	1940	1941	1940
January	4,663,695	4,032,022	35,337	43,240
February	4,197,872	3,311,480	33,627	38,720
March	.....	3,270,499	.....	46,260
April	.....	3,137,019	.....	43,384
May	.....	3,513,683	.....	44,973
June	.....	3,818,897	.....	44,631
½ year	.....	21,083,600	.....	261,208
July	.....	4,053,945	.....	43,341
August	.....	4,238,041	.....	37,003
September	.....	4,176,527	.....	33,024
October	.....	4,445,961	.....	32,270
November	.....	4,403,230	.....	31,155
December	.....	4,547,602	.....	35,666
Year	.....	46,948,906	.....	473,667

*These totals do not include charcoal pig iron. †Included in pig iron figures.

Daily Average Production of Coke Pig Iron

	1941	Per Cent Capacity	1940	Per Cent Capacity
January	150,441	95.5*	130,061	85.8
February	149,924	95.2	114,189	75.1
March	.....	...	105,500	68.9
April	.....	...	104,567	68.6
May	.....	...	113,345	74.8
June	.....	...	127,297	83.9
½ year	.....	...	115,844	76.1
July	.....	...	130,772	86.3
August	.....	...	136,711	90.4
September	.....	...	139,218	92.2
October	.....	...	143,418	94.8
November	.....	...	146,774	97.1
December	.....	...	146,697	97.2
Year	.....	...	128,276	84.6

*Revised for capacity as of Dec. 31, 1940.

Merchant Iron Made, Daily Rate

	1941	1940	1939
January	20,812	16,475	11,875
February	21,254	14,773	10,793
March	.....	11,760	10,025
April	.....	13,656	9,529
May	.....	16,521	7,883
June	.....	13,662	8,527
July	.....	16,619	9,404
August	.....	17,395	11,225
September	.....	17,571	12,648
October	.....	18,694	16,409
November	.....	22,792	16,642
December	.....	19,779	16,912

The Iron Age Comparison of Prices

Advances Over Past Week in Heavy Type; Declines in Italics

	Mar. 4, 1941	Feb. 25, 1941	Feb. 4, 1941	Mar. 5, 1940
Flat Rolled Steel:				
(Cents Per Lb.)				
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Tin and Terne Plate:				
(Dollars Per Base Box)				
Tin plate	$5.00	$5.00	$5.00	$5.00
Manufacturing ternes	4.30	4.30	4.30	4.30
Bars and Shapes:				
(Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Wire and Wire Products:				
(Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails:				
(Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel:				
(Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Wire Rods and Skelp:				
(Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

	Mar. 4, 1941	Feb. 25, 1941	Feb. 4, 1941	Mar. 5, 1940
Pig Iron:				
(Per Gross Ton)				
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.84	$24.84
No. 2, Valley furnace	24.00	24.00	24.00	23.00
No. 2, Southern Cin'ti	24.06	24.06	24.06	23.06
No. 2, Birmingham	19.38	19.38	19.38	19.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	23.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	24.34
Basic, Valley furnace	23.50	23.50	23.50	22.50
Malleable, Chicago†	24.00	24.00	24.00	23.00
Malleable, Valley	24.00	24.00	24.00	23.00
L. S. charcoal, Chicago	30.34	30.34	30.34	30.34
Ferromanganese‡	120.00	120.00	120.00	100.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton. ‡For carlots at seaboard.

Scrap:				
(Per Gross Ton)				
Heavy melt'g steel, P'gh	$21.00	$21.00	$21.25	$17.00
Heavy melt'g steel, Phila	20.00	20.00	20.00	17.25
Heavy melt'g steel, Ch'go	**19.50**	19.25	19.25	15.875
Carwheels, Chicago	20.25	20.25	20.75	17.25
Carwheels, Philadelphia	23.00	23.00	23.00	20.25
No. 1 cast, Pittsburgh	22.25	22.25	22.25	18.25
No. 1 cast, Philadelphia	**24.50**	23.75	23.75	20.25
No. 1 cast, Ch'go (net ton)	19.75	19.75	18.75	14.25
Coke, Connellsville:				
(Per Net Ton at Oven)				
Furnace coke, prompt	$5.50	$5.50	$5.50	$4.00
Foundry coke, prompt	5.75	5.75	5.75	5.25
Non-Ferrous Metals:				
(Cents per Lb. to Large Buyers)				
Copper, electro., Conn.*	12.00	12.00	12.00	11.50
Copper, Lake, New York	12.00	12.00	12.00	11.50
Tin (Straits), New York	*51.25*	53.00	50.375	47.50
Zinc, East St. Louis	7.25	7.25	7.25	5.75
Lead, St. Louis	**5.60**	5.50	5.35	5.10
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

*Mine producers only.

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 129-138 herein.
On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Composite Prices

	FINISHED STEEL	PIG IRON	SCRAP STEEL
March 4, 1941	2.261c. a Lb.	$23.45 a Gross Ton	$20.17 a Gross Ton
One week ago	2.261c. a Lb.	$23.45 a Gross Ton	$20.08 a Gross Ton
One month ago	2.261c. a Lb.	$23.45 a Gross Ton	$20.17 a Gross Ton
One year ago	2.261c. a Lb.	$22.61 a Gross Ton	$16.71 a Gross Ton

	FINISHED STEEL High	FINISHED STEEL Low	PIG IRON High	PIG IRON Low	SCRAP STEEL High	SCRAP STEEL Low
1941					$22.00, Jan. 7	$20.00, Feb. 11
1940	2.261c., Jan. 2	2.211c., Apr. 16	$23.45, Dec. 23	$22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.286c., Jan. 3	2.236c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.512c., May 17	2.211c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.512c., Mar. 9	2.249c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 10
1936	2.249c., Dec. 28	2.016c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.062c., Oct. 1	2.056c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.118c., Apr. 24	1.945c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.953c., Oct. 3	1.792c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.915c., Sept. 6	1.870c., Mar. 15	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.981c., Jan. 13	1.883c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.192c., Jan. 7	1.962c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.236c., May 28	2.192c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Based on averages for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Summary of the Week

• Steel bookings heavier in February, resulting in larger backlogs and extension of deliveries . . . Increasing amount of defense business . . . Wage conferences may be cause of delay in second quarter price announcements . . . Scrap scarcity grows more threatening.

STEEL bookings in February were from 10 to 25 per cent above those of January, having run considerably ahead of production and shipments, resulting in further building up of backlogs and extension of deliveries.

An increased amount of current buying is for defense work. It is difficult for the steel companies to make reliable estimates because indirect defense work is not always easily determined, but it is indicated that, including British and Canadian requirements, preference orders are running from 35 to 40 per cent of new bookings.

Except where preference ratings are exercised, deliveries now promised range from July to November on a good many products. In plates and sheets, in which backlogs are heaviest in relation to capacity, third quarter shipment is now difficult to obtain and quotations are quite commonly for October and November.

The products on which there are the most severe restrictions so far as civilian consumers are concerned are the nickel steel alloys, including stainless, in which a modified form of priority, though not officially announced, is in effect.

STEEL companies are utilizing every possible method to keep a curb on excess buying and to discourage specifications that tend to slow up the rolling processes. Nearly all mills are trying to cut down the size of orders and to postpone shipments where the customer will not be inconvenienced thereby. On bars, sheets and some other products they are placing a minimum limit of three tons of one size and grade to avoid the lost time that occurs in the handling of small orders.

A complicating situation is the fact that many consumers of steel have received more business than they themselves anticipated, therefore they need more steel than they had originally purchased.

President Roosevelt's comment on the Gano Dunn report of steel capacity that there is ample steel for all requirements, civil as well as military, coincides with the belief that the steel industry has been voicing, but the congestion of orders borders on indigestibility and the pressure for early delivery is often too acute.

In a situation where delivery is much more important than price, steel consumers do not seem to be greatly concerned over delay in the announcement of second quarter prices, undoubtedly caused by wage conferences at Pittsburgh, which may reach a conclusion this week. Opinion in the industry is that, if a wage increase is granted, it will be much less than the 10 per cent advocated by the Steel Workers Organizing Committee, possibly not more than 5 per cent, and that there will be no horizontal increase in prices.

PRODUCTION of steel is being pushed upward as rapidly as possible, despite interruptions caused by last week's strike at Buffalo and equipment stoppages for repair. With the Pittsburgh and Chicago districts, which account for more than 44 per cent of the country's capacity, operating this week at 100 per cent and with some smaller districts at above that figure, the industry rate has risen a point to 98 per cent. In six districts operations are at 100 per cent or higher.

However, pig iron production fell off slightly in February. The month's total was 4,197,872 net tons compared with 4,663,695 tons in January. On a daily basis the loss was 0.3 per cent, or from 150,441 tons in January to 149,924 tons in February. There was also a loss of three furnaces to 202 on March 1 against 205 on Feb. 1. Since March 1 a furnace at Birmingham has gone out for repairs and a new furnace at Lorain, Ohio, has gone into blast. The supply of merchant pig iron is getting tighter, but has not yet become critical.

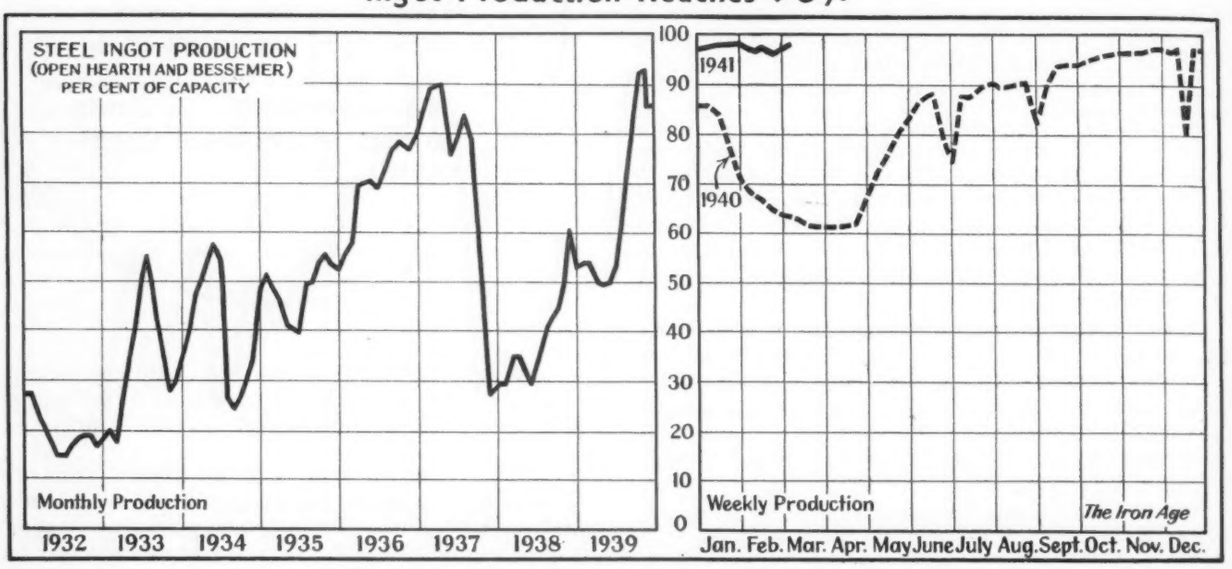
SCRAP appears to be in a much more dangerous position. In several areas scrap is harder to get. At Detroit nearly all prices, excepting on primary steel grades, have advanced sharply. Steel scrap is stronger at Chicago, and THE IRON AGE scrap composite price has advanced to $20.17 which is 17c. above its recent low point. Differentials for various grades of scrap and for geographical districts have been worked out by the Price Stabilization Division of the National Defense Commission and submitted to dealers, steel mills and others for comment, which must be received by next Saturday. If there are no serious objections to the schedules worked out, the Price Stabilization Division will announce these differentials soon thereafter.

The Industrial Pace . . .

SMALL RECESSIONS in three of the series making up THE IRON AGE index of capital goods activity lowered the index 1.8 points to 123.2 in the past week. In the preceding week the index was 125.0 (revised), a month ago, 125.5, and in the comparable week of 1940, 84.0. Only components to show a gain were steel ingot production, which was up again to 97 per cent of capacity, and heavy construction awards, which were up 1.6 points. Automobile assemblies fell off to 126,550 from 127,740 (revised) two weeks ago, while lumber carloadings and activity at Pittsburgh were lower.

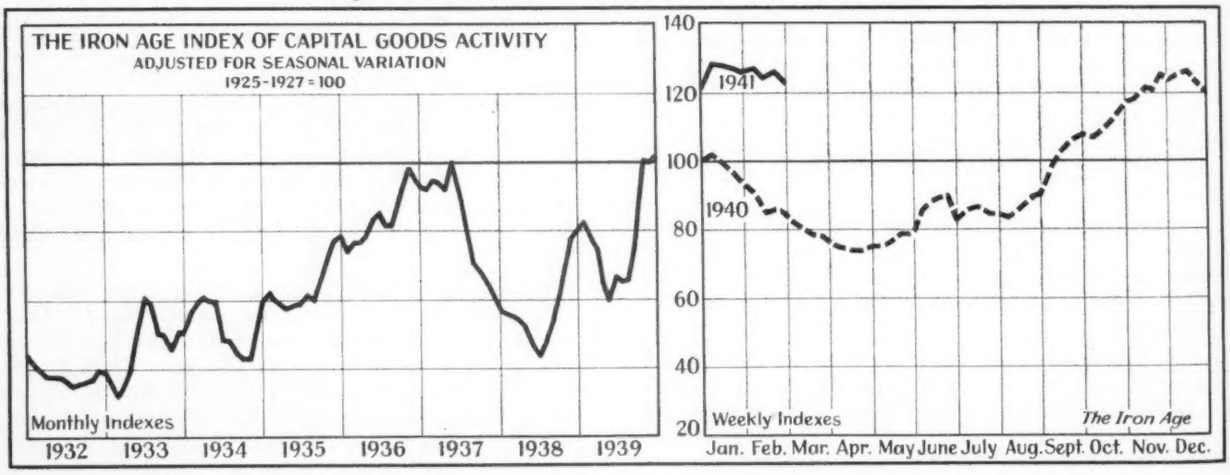
HEAVY STEELMAKING REQUIREMENTS are reflected in sustained high coke output. January production of by-product and beehive coke totaled 5,446,989 net tons, as compared with 5,352,930 tons in December, and 4,945,368 tons in January, 1940. Bookings of fabricated structural steel in January, 258,499 tons, established a new high for the 10-year period since April, 1931, when 284,800 tons were ordered. Previous high for the period was 240,942 tons booked in October, 1940. Average weekly carloadings in February, 706,047, were about 3 per cent higher than the January average.

Ingot Production Reaches 98%



District Ingot Production, Per Cent of Capacity	Pittsburgh	Chicago	Valleys	Philadelphia	Cleveland	Buffalo	Wheeling	Detroit	Southern	S. Ohio River	Western	St. Louis	Eastern	Aggregate
Current Week	100.0	100.0	99.0	96.0	96.0	104.5	85.0	96.0	95.0	109.5	102.5	105.5	92.5	98.0
Previous Week	98.0	99.0	97.0	98.0	93.0	104.5	85.0	100.0	105.5	99.5	102.5	105.5	92.5	97.0

Capital Goods Index 1.8 Points Lower

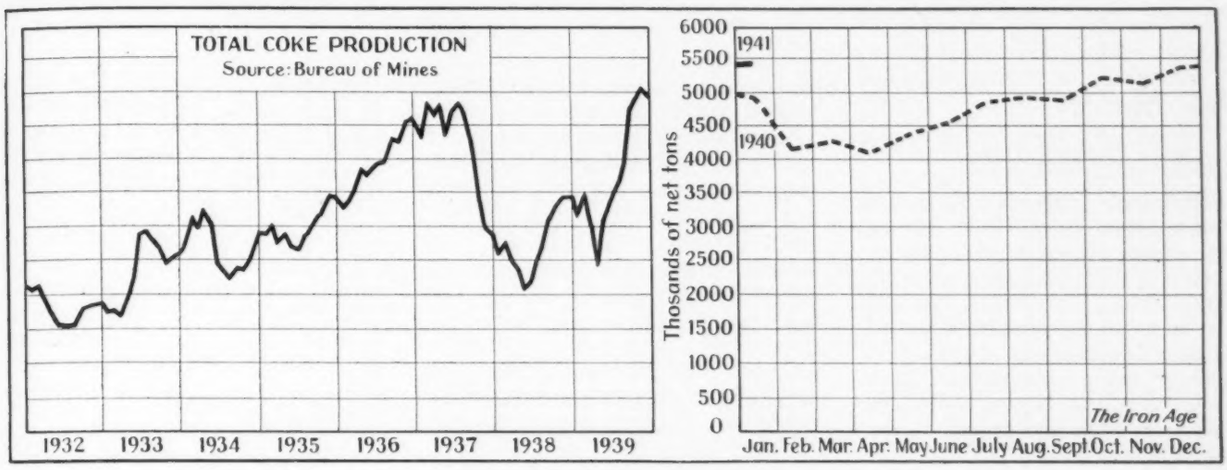


Component ▼ Week Ended ➤	Mar. 1	Feb. 22	Feb. 1	Mar. 2 1940	Mar. 2 1929
Steel ingot production[1]	130.1	129.9	131.3	85.1	119.3
Automobile production[2]	130.3	135.0*	132.6	103.8	123.8
Construction contracts[3]	160.2	158.6	155.0	77.4	134.7
Forest products carloadings[4]	70.9	73.7	79.4	58.2	120.7
Pittsburgh output and shipments[5]	124.7	127.9	128.5	95.6	117.0
COMBINED INDEX	123.2	125.0*	125.5	84.0	123.1

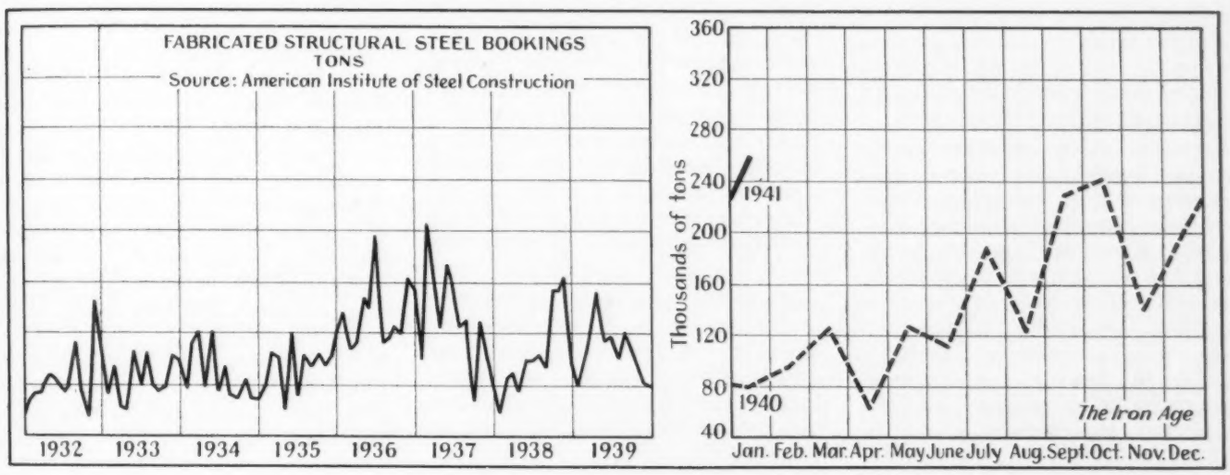
*Revised.

Sources: [1] THE IRON AGE; [2] Wards Automotive Reports; [3] *Engineering News-Record;* [4] Association of American Railroads; [5] University of Pittsburgh. Indexes of forest products carloadings and activity in Pittsburgh area reflect conditions as of week ended Feb. 22. Other indexes cover week of March 2.

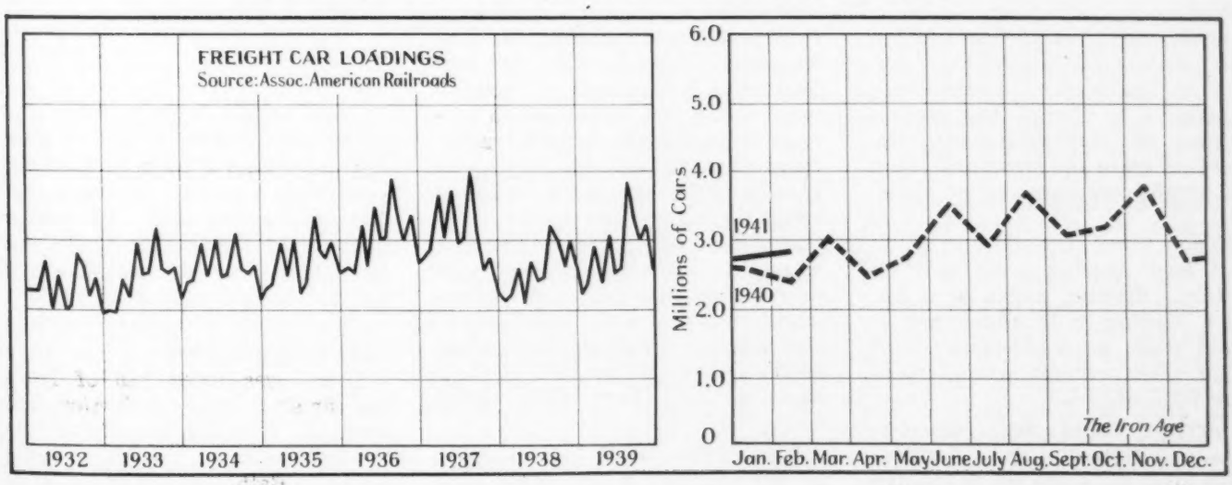
Trend of Coke Production Continues Upward


TOTAL COKE PRODUCTION
Source: Bureau of Mines
1932 1933 1934 1935 1936 1937 1938 1939
Thousands of net tons
6000 5500 5000 4500 4000 3500 3000 2500 2000 1500 1000 500 0
1941
1940
The Iron Age
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.

Fabricated Steel Bookings at 10-Year High


FABRICATED STRUCTURAL STEEL BOOKINGS
TONS
Source: American Institute of Steel Construction
1932 1933 1934 1935 1936 1937 1938 1939
Thousands of tons
360 320 280 240 200 160 120 80 40
1941
1940
The Iron Age
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.

February Carloadings 14% Heavier Than 1939


FREIGHT CAR LOADINGS
Source: Assoc. American Railroads
1932 1933 1934 1935 1936 1937 1938 1939
Millions of Cars
6.0 5.0 4.0 3.0 2.0 1.0 0
1941
1940
The Iron Age
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.

Market News

. . . THE WEEK'S ACTIVITIES IN IRON AND STEEL

New Business

. . . February tonnage as much as 25% over January's

Pittsburgh reports February tonnages ran from 15 to 25 per cent ahead of those of January. Fresh orders in the past week were fully as heavy as a week ago and were 30 to 40 per cent in excess of actual shipments or production. Although some sources predict a slowdown in the future, there are no signs of such leveling off at the present time.

Producers of alloy steel are going through a lot of headaches, scheduling and processing nickel bearing alloy steels. The latter have been especially popular with Army and Navy departments and it is said that some change in specifications must be made soon in an effort to alleviate the current situation.

CHICAGO mills received more business in February than in the preceding month, based on a per day ratio. Specifications are considerably ahead of shipments but a tempering of the buying wave is expected. Alloy steel buying was especially strong during the past week, with automotive interests coming in heavily. Automobile parts manufacturers were also listed among the week's principal buyers. Mills notice an increasing amount of alloy specifications coming from direct defense interests. After a three weeks' slump, piling inquiries and orders nosed up sharply.

Sales executives at CHICAGO feel that customers' inventories continue to hold about the same level, though, if anything, they are beginning to edge downward. Demand for plate and structural items in CHICAGO continues at a very high level.

Inland Steel Co. is now shipping lead-bearing steel only to Britain. Several weeks ago, another leading mill announced it would make no lead-bearing steel at all after current commitments were fulfilled.

Barring unexpected interruptions, CLEVELAND and YOUNGSTOWN steel mills are set to shatter all previous delivery records during March. Order backlogs at the start of the month are heavier than ever before. A few production units are sold out for the remainder of this year, and others are booked into third quarter.

While CLEVELAND sellers have detected a slight decline during the past few days in a few flat rolled items, the dip is relatively unimportant so far. It is generally expected at CLEVELAND and YOUNGSTOWN that much tonnage will come out later this year, although sheets and strip may not share like items vital to the United States and British armament programs.

The necessity to put all shipments of steel into immediate and essential use is likely to become more apparent in the near future, according to CLEVELAND sellers, who point out that, while in gross tonnage there is plenty of production capacity, nevertheless the mass of orders occasionally borders on indigestibility, while the pressure for immediate delivery is often too acute.

February business at Buffalo ran an estimated 10 to 20 per cent ahead of the January totals. New orders and specifications are greatly in excess of shipments and the latter have been extended further as a result of the "walkout" of several thousand workers at Bethlehem's Lackawanna plant last week.

Deliveries in EASTERN PENNSYLVANIA are so greatly extended on most products and the supply situation generally is so tight that new business has been and is becoming more a question of how much tonnage it is feasible to book rather than what buyers are willing to specify. Mills have been forced to accept in many cases only a fraction of the tonnage ordered in order to retain a semblance of discretion over rolling schedules for the remainder of the year. Least confusion exists in the structural and bar markets, where production and shipments have gone most smoothly.

The market trend is unchanged at BIRMINGHAM with orders continuing to run substantially ahead of shipments. Unprecedented demand there for bars and plates is unabated and the market generally goes into March without a single weakness.

Most Pacific Coast structural steel fabricators have prospects of capacity operation for some time ahead on construction projects, eliminating for the time being the possibility of general use of these shops for fabrication of ordnance components.

The Bureau of Supplies and Accounts, Navy Department, has asked for bids on March 14 for 94,555 tons of steel for its semi-annual requirements at the various yards. The contracts of these tonnages will terminate on Sept. 30. The steel wanted covers plates, sheets, strips, shapes and bars, the largest single item being 41,809 tons of medium black plates. The requirements, in net tons, follow: Plates: medium black, 41,809, medium galvanized, 13,783, high tensile black, 7347, high tensile galvanized, 4107; sheets: medium black, 4630, medium galvanized, 1107; strips: medium black, 352, medium galvanized, 126; shapes: medium black, 10,346, medium galvanized, 3434, high tensile black, 676, high tensile galvanized, 226; bars: medium black, 1996, medium galvanized, 666; strips and bars: medium black, 2966, galvanized steel, 984.

Steel Operations

. . . Industry rate is up a point to 98 per cent

With both the PITTSBURGH and CHICAGO districts, which account for more than 44 per cent of the company's capacity, operating at 100 per cent and with four smaller districts at above this figure, one as high as 109.5 per cent, the rate for the industry as a whole this week is fully 98 per cent, up a point over last week.

There was some loss of ingot and finished steel production last week at BUFFALO because of the two-day strike at the Lackawanna works of Bethlehem Steel Co. Out-

put of finished steel at a CHICAGO district mill is being hampered by the fact that a slabbing mill has been forced into idleness for repairs.

From 11 p. m. on Wednesday until 11 p. m. Friday of last week only six of the 30 open hearths at the Bethlehem plant at Lackawanna were operating. By Sunday 28 were back in service and the plant will be back on full operation this week.

Ingot production at Birmingham has declined with the blowing out of a blast furnace at the Fairfield Works of Tennessee Coal, Iron & Railroad Co. for repairs. One open hearth has been taken off at the Fairfield works and one at Ensley, leaving Tennessee with 14 operating compared with 16 last week.

Pig Iron

. . . Tightness in supply acute but not yet dangerous

Pittsburgh reports a continuation of a tight situation, with many producers seeking heavy tonnages of blast furnace scrap in order to increase pig iron production.

Supply of pig iron in CHICAGO is narrow but not dangerous. New customers are definitely not wanted by most producers, who are taking pains to see that all old customers, not matter how small, receive their requirements by a process of allocation. Demand increases steadily. Foundries there are going full blast. Second quarter bookings are heavy.

The tightness in supply of merchant iron is admitted at BUFFALO but is not acute and prospects are that the area may not feel the situation as much as other districts as three additional blast furnaces are to be blown in before the end of this year. Bethlehem's five blast furnaces, all of which were reported to have been banked up during the two-day strike last week, were operating at capacity again early this week.

Eastern Pennsylvania producers are standing pat as regards new orders and are concentrating on deliveries with a view to eliminating temporary shortages springing up from time to time. Merchant furnaces seem disinclined to commit themselves further on second quarter tonnages. Basic requirements of large integrated producers are so heavy that even regular buyers are not able to obtain all the iron they desire.

Shipments of Southern iron into SOUTHERN OHIO continued to be heavy during the month of February and on a par with that of preceding periods, but Northern iron shipments showed some shrinkage. This latter condition is largely due to the fact that the only merchant producer in SOUTHERN OHIO has been out of the market during the entire first quarter and has not yet made announcement for the second. Indications, however, are that this furnace will be back in blast for second quarter delivery and announcement of the opening of order books is expected any day.

Shipments to melters in the St. Louis area continue heavy, and it is believed that in some cases melters are accumulating stocks. A few sales are being mode for later delivery on the basis of the price prevailing at time of shipment.

New England consumption is heavy. Foundries are taking in pig iron more rapidly than at any time since World War No. 1. Some foundries have taken up all their contract iron and are forced to buy from time to time.

The new $1,500,000 blast furnace of National Tube Co. at Lorain was blown in over the last week-end, reports CLEVELAND, adding 1120 net tons daily capacity or an increase of about 12 per cent at the plant. Rushed to completion in four months, the stack is completely electrically welded. National Tube Co. is now operating all five of its furnaces at Lorain.

No. 6 blast furnace at the Ohio Works at Carnegie-Illinois Steel Corp. has suspended production for relining at Youngstown. Several other Valley stacks may be withdrawn before long.

Demand for silvery iron needed by steel plants for their heats is at a record peak. This has resulted in curtailment of the iron from the foundry trade, and a few melters already have revised their practice. Output of silvery iron is limited.

At BIRMINGHAM, the Tennessee Coal, Iron & Railroad Co. took off its No. 5 furnace at Fairfield steel works March 1 for major repairs, which are expected to be completed in eight to 10 weeks.

Prices

. . . Second quarter announcement delayed by wage conference

Although second quarter price announcements had been expected before now, action probably will not be taken until the wage settlement between the U. S. Steel Corp. and the SWOC is consummated. Consensus at PITTSBURGH is that there will be no change in steel prices for second quarter delivery. This opinion is predicated on the belief that any wage increase granted will be somewhat less than 10 per cent, since the latter figure would obviously call for a change in steel prices.

Sheets and Strip

. . . Orders now extending into fourth quarter

At the rate new sheet and strip business is flowing into PITTSBURGH, third quarter books will be completely filled soon. Already some concerns are forced to quote fourth quarter on some flat rolled sizes and grades. The heaviest buyer continues to be automotive industry, but miscellaneous sources are specifying just as heavy from a relative standpoint.

Schedules of hot mills in the CLEVELAND and YOUNGSTOWN districts are full for months ahead under the deluge of buying for extended shipments. Some sellers believe they have detected a slight easing of demand during the past few days, but it is by no means certain that a trend has been established in that direction. Delivery promises by some producers on certain items like hot rolled annealed in light gages, blue stove pipe sheets and in some cases galvanized sheets are well into 1942. Inquiries for stainless for the national defense program have multiplied rapidly of late.

Deliveries suffered considerably in CHICAGO last week on sheet and strip items. Wide strip, 2½ in. to 8 in., was moved back by four weeks. Galvanized, hot and cold rolled sheets went back two weeks, and strip mill sizes only a week. One steel maker got an automotive sheet order for more than 10,000 tons last week. Railroad car builders also took a large tonnage. A toy manufacturer who is tem-

porarily turning out defense orders placed a big sheet order also.

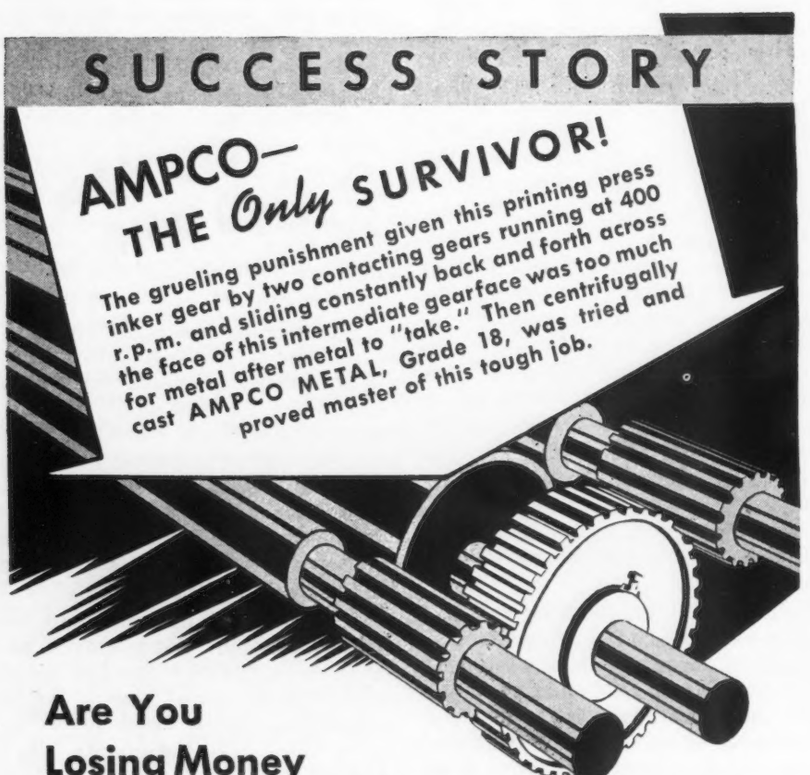
Many sheet steel consumers in the SOUTHERN OHIO DISTRICT are eagerly attempting to cover needs for the remainder of the year. As a result, new business extends well into the third quarter and into the closing quarter of the year. Defense business is tending to expand and mill interests are having some difficulty holding to allotment schedules. Voluntary priorities, of course, have been well observed on all known defense business, which also has caused some disruption of rolling schedules. Production is going at mill capacity.

Flat rolled deliveries in EASTERN PENNSYLVANIA have become as tight as plates, being quoted now usually for fourth quarter. Cold rolled material continues slightly better than hot rolled. Some success in stocking by consumers seems to be in evidence in spite of attempts by mills to prevent it, although to what extent can not be determined.

SUCCESS STORY

AMPCO— THE *Only* SURVIVOR!

The grueling punishment given this printing press inker gear by two contacting gears running at 400 r.p.m. and sliding constantly back and forth across the face of this intermediate gearface was too much for metal after metal to "take." Then centrifugally cast AMPCO METAL, Grade 18, was tried and proved master of this tough job.



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If there are metal parts in either your product or production tools that "can't take it"— and are slowing up production or creating customer ill will — try AMPCO METAL. It has a unique reputation for doing a job after all other metals have failed. It's exceptional in its strength and resistance to wear, fatigue, impact and corrosion. Available in many grades of hardnesses and physical properties. Write for data sheets.

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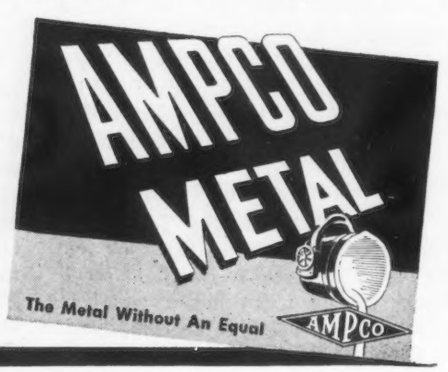

Semi-Finished Steel

. . . Orders still running in excess of shipments

Reporting no abatement in fresh demand, PITTSBURGH finds semi-finished steel orders somewhat in excess of production and shipments. No change in this market condition is expected for some time to come. Non-integrated sheet mills are finding it difficult, if not impossible, to get what they consider to be their full requirements. Skelp supplies are tight and rerolling billets are going to regular customers only. This latter condition reflects to some extent British requirements.

Inquiry for all types of semi-finished steel remains exceedingly heavy, according to CLEVELAND and YOUNGSTOWN sellers. Alloy and low carbon billets are sought particularly.

Wire Products

. . . Users having difficulty in getting finer grades

• • • **Several users** at CLEVELAND report increasing difficulty in obtaining deliveries on fine wire in the desired quantities, sizes and quality. Demand for merchant products remains very strong at CLEVELAND. Nail orders in popular sizes continue well above production capacity due to requirements of housing and cantonment projects and the attempts of jobbers to build up inventories.

Galvanized items which represent a good portion of total merchant product sales are the subject of some uncertainty, especially where heavy coatings are required. It is understood surveys are being conducted with a view toward ascertaining where paint coatings might be satisfactorily substituted for galvanizing.

Little change is noted from last week in total wire demand at PITTSBURGH. Merchant wire requirements are increasing, manufacturers' wire demand is in full bloom, and rod supplies are tighter than at any time yet.

Japan is inquiring for 50,000 kegs of small nails requiring approximately 2500 tons of steel. Some quotations on this inquiry have run as much as $30 a ton over the domestic base price.

In anticipation of spring demand, which is always heavy, wire jobbers in the CHICAGO territory are trying their best to build up stocks. Although unable to get as much as they desire, jobbers have been successful so far in solidifying their position. Wire business generally is holding a strong but not too heavy level. Mills there have received inquiries from the Air Corps, Wright Field, Dayton, Ohio, for a large tonnage of assorted wire and wire coils.

Reinforcing Steel

. . . Awards total 14,400 tons, new jobs 3750 tons

Reinforcing steel awards total 14,400 tons and include 4000 tons for the Remington small arms plant at Denver; 3400 tons for the Hercules Powder Co.'s bag and ammunition plant at Dublin, Va., and 2000 tons for a naval air base at Argentia, Newfoundland.

New reinforcing steel projects for 3750 tons include no inquiry of more than 700 tons.

Railroad Buying

. . . Orders placed for 2514 freight cars, 71 locomotives

Plans for equipment expansion led this week to the purchase of 2514 freight cars, 71 locomotives and 45 modern passenger cars, and to the publication of schedules for the acquisition of 1200 freight cars.

Central of New Jersey has received court authorization to proceed with the building of 1000 hoppers, 50 cement cars and 50 cabooses at the Reading Company's shops.

Baltimore & Ohio has awarded 500 gondolas to American Car & Foundry Co. and 500 gondolas to Bethlehem Steel Co. Bethlehem is also building 14 100-ton flat cars for its Johnstown plant.

Pere Marquette purchased 400 all steel box cars, 100 from each of the following: American Car & Foundry, General American Transportation, Pullman-Standard and Greenville Steel Car Co.

Canadian National placed an order of 25 4-8-4 freight locomotives for the Grand Trunk Western Service with American Locomotive Co.

Chicago & North Western bought five diesel-electric locomotives, of 2000 hp. rating. Four are to be built by the Electro-Motive Corp. and one by American Locomotive Co. Pullman-Standard will build 25 streamlined passenger cars for this road.

Atchison, Topeka & Santa Fe has ordered two 5400 hp. diesel-electric freight locomotives and one of 2000 hp. for passenger service from the Electric-Motive Corp.

The War Department has on order with the Davenport-Besler Corp. 22 locomotives of different types from 20-ton gasoline-mechanical to 35-ton diesel-electric. The navy is buying six 300-hp. diesel-electric locomotives from the Vulcan Iron Works. Also bids are being

1941

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taken by the Bureau of Supplies and Accounts on six 70-ton steel flat cars equipped with armor plate floors.

Chicago, Burlington & Quincy has ordered five 44-ton diesel-electric switching locomotives from the Davenport-Besler Corp.

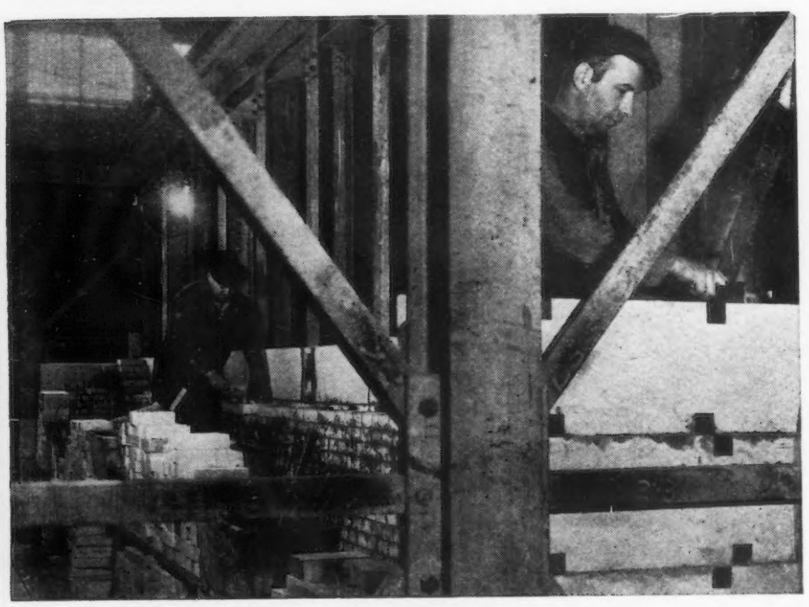
The Vulcan Iron Works is constructing five light locomotives for industrial concerns.

Chesapeake & Ohio has awarded American Car & Foundry Co. 20 all-steel passenger coaches, at a cost of about $930,000.

Western Maryland has purchased 2000 tons of rails, 1000 from Carnegie-Illinois Steel Corp. and 1000 from Bethlehem Steel Co. The government is taking bids on rail expansion devices for track construction on the Central Valley of California project.

The budget of the Chicago, Milwaukee, St. Paul & Pacific provides for the expenditure of $7,300,000, including additions to track and rolling stock: 35,000 tons of rails will be laid, and 625 freight and 20 passenger cars are to be ordered.

Union Pacific contemplates ordering 500 stock cars, while Rock Island is expected to buy 25 70-ton hopper-bottomed gondolas.



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Tubular Goods

. . . Strong demand for pipe continues

With merchant pipe orders becoming more brisk each week and with miscellaneous line pipe demand still strong, PITTSBURGH sees little or no change for some time in the total strong volume of pipe sales.

Plates

. . . Tight situation bringing more allocations for defense

Pittsburgh reports the plate situation as tight as ever. Government orders involving large tonnages are being allocated among the various steel companies. This method of allocating tonnages on products carrying long delivery promises may be instituted in other products within the next month or two.

At CLEVELAND, February was a tremendous month for plate allocations. According to present indications there will be a lag until actual specifications of shipbuilders are received, then plate mills will face uninterrupted rollings for months ahead.

A leading CHICAGO plate producer has moved back deliveries on sheared plates, 30 to 84 in., and universal plates to four to five months. This is about a two weeks' setback. One producer has received large plate orders from two water tank builders. Railroad demand is still strong.

Deliveries have recently been extended to November on many types by three of the largest sellers in EASTERN PENNSYLVANIA in spite of the fact that specifications are being watched carefully and tonnage is not being booked indiscriminately.

Warehouse Business

. . . Deluge of inquiries for steel out of stock

Cleveland warehouses are being deluged with frantic inquiries from steel users unable to get quick service at mills. The warehouses are doing a good job of trying to keep pace with the overwhelming demand but are limited by the ability to serve out of stocks and by the limit of trucking capacity. Heaviest pressure is on plates, alloy steel and cold finished bars. Inquiries for steel with nickel content are large. Demand for structural material has eased.

Warehouses in the CHICAGO area are concerned with their stocks. They have been selling more than they have been receiving for some time.

Merchant Bars

. . . Orders are still ahead of shipments

Automotive and miscellaneous sources are specifying heavily and incoming bar business at PITTSBURGH is several steps ahead of shipments or production. Backlogs are at the highest point in several years.

Actual specifications and releases in February at CLEVELAND greatly exceeded production.

Structural Steel

. . . Awards drop to 11,100 tons, new projects 20,925 tons

Fabricated structural steel awards at 11,100 tons are the lowest since the last week in May, 1940. The only lettings of size are 2740 tons for a factory and boiler house at Beaver, Pa., for the Curtiss-Wright Corp., and 1000 tons for a storage and welding building for the Bath Iron Works, Bath, Me.

New structural steel projects declined to 20,925 tons from 31,700 tons last week. The largest new inquiries include 2700 tons for a government assembly shop at Long Beach, Cal.; 2600 tons for a press plant building for the Midvale Co. at Nicetown, Pa.; 1800 tons for boiler and turbine rooms at Fisk Station, Chicago, for the Commonwealth Edison Co.; 1600 tons for the Holston River Bridge at Morristown-Bear Station, Tenn., for the TVA; 1200 tons for a crane runway for the Navy Department, Philadelphia, and 1000 tons for a factory for the King Machine Tool Co., Cincinnati.

Tin Plate

. . . Cold reduction mills at 96%

. . . Demand grows

Cold reduction tin plate mills continue to operate at approximately 96 per cent of capacity. Tin plate specifications from miscellaneous can makers are literally flooding the mills. Sanitary can makers are also specifying heavily and mill stocks of tin plate are being reduced. Promises on tin plate shipments are nine weeks and longer. In some instances users are asking for heavier shipments than their contracts specified.

One CHICAGO producer is out of the market and others are near capacity, though still accepting new business. Deliveries average eight to 12 weeks.

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GARLOCK

Machine Tools

. . . SALES, INQUIRIES AND MARKET NEWS

Price "Ceiling" May Keep Some Tools From Market

Chicago

• • • **Effect of new price "ceilings,"** which went in force on March 1 on used machine tools, has met with divided opinion among dealers here. Split about 50-50 are those who believe the price schedule is fair under present conditions compared to those who feel the "ceilings" will defeat the purpose of securing enough fairly modern used machines to fill the breach in the defense program until new equipment deliveries have caught up with demand.

Some dealers point out that the allowance of 70 per cent of present new purchase price on machines built before 1920 is more than fair. They cite as an example, that a No. 2 miller built around 1910 to sell new for $1200 would bring around $7000 today for the equivalent type of machine. Assuming that equipment of this vintage has been purchased at a fair price, the trade feels that the 70 per cent rebuilt allowance and 50 per cent "as is" is fair enough. The rub to the schedule, they assert, is in the allowance of up to 95 per cent for used machinery manufactured since 1930.

It is machines in this latter classification, such as jig borers, vertical turret lathes, universal horizontal boring mills, late type milling machines, etc., that are in greatest demand today. And certain dealers contend that they cannot purchase for resale and rebuild such equipment under the present price ceiling, since they say it is not enough to bring out the few good machines available. Furthermore, the schedule does not warrant small dealers scouring the country for late machines. They make the point that it would be better to lower the ceiling on machines built before 1920 and remove all barriers from those manufactured after 1930.

Profiteering will be avoided since the dealers must report weekly to the Price Stabilization Division of the National Defense Advisory Commission on the machines in stock and their proposed selling price. Another deterring factor against profiteering is knowledge of the fact that used equipment had better be sold within the coming year or be held indefinitely.

• • • **On the other hand,** certain used machinery dealers advance the contention that the price schedules are as fair as conditions permit—and that those who attempt to hold up anyone will find their machines commandeered. Besides, the newer equipment in greatest demand is in full production anyway and very little could be brought out at any price. But despite difference, all dealers agree on their desire to cooperate with government and industry at a time when their products and efforts are more than ever necessary to the defense program.

Production Forging Ahead

Cleveland

• • • **The rate at which production** has been expanding indicates that the machine tool industry is making gratifying headway on its national defense assignment and probably is nearer its goal than any other industry.

Considerable buying is expected over the next few months, however. Passage of the lease-lend bill will generate an influx of purchases, many of them expected to carry high preference ratings.

Local dealers report that February business volume was at approximately the same level as January.

Non-Ferrous Metals
. . . MARKET ACTIVITIES AND PRICE TRENDS

New York

• • • **The Metals Reserve Co.** in the past week announced the purchase of an additional 35,000 tons of copper, bringing total purchases so far to 235,000 tons. The latest transaction involves metal already in this country which is available immediately to fill pressing shortages developing in some quarters. Some speculation exists as to whether some 25,000 tons of unshipped French copper may not be requisitioned but to date no decision has been announced. A portion of that supply may have been taken up previously. Feature of the regular non-ferrous markets was an increase in lead prices of $2 a ton. Excepting tin, which eased in the week, other prices were unchanged.

Custom smelter activity remained at substantially the same levels as in the preceding week, with supplies strictly limited. Some transactions were reported for March delivery but tonnages were not large. Mine producers have opened their June books and a good volume of business was done in that quarter on the 12c. a lb., delivered Valley basis. The export market was unchanged at quiet at 10.50c. a lb., f.a.s.

Zinc

In the absence of news from Washington regarding more extended regulatory measures, market conditions continue unchanged. Trading in zinc on the Commodity Exchange was suspended as of March 4, all future transactions being limited to the liquidation of open positions. In the regular market producers continued the policy of apportioning metal among consumers on the basis of 7.64c. a lb. delivered New York. Sales in the past week totaled 3014 tons, a substantial increase from the 900 tons sold in the preceding period.

Lead

The market opened the current week in rather a confused state when one of the principal sellers raised its price $2 a ton on Monday, while others remained at the old level. On the following day other producers followed suit, resulting in a market now quoted at 5.75c. a lb., delivered New York. Immediately after announcing the advance, one seller disposed of its intake early in the day, while demand in other directions held up very well. Business in the past week was considerably in excess of the week before, a significant factor in the market rise being the recurrence of waiting lists. Foreign lead is being regularly drawn upon to the extent of 10,000 to 15,000 tons a month in order to conserve domestic production, and the latest price revision should further increase the flow.

Tin

Demand in the past week eased from the level of excited buying which characterized the market in the previous week but continued moderately active. Prompt Straits metal declined to 51.125c. on Thursday but rose again on Friday to 51.25c. a lb., delivered New York, the price prevailing at the present time. Buyers have been sensitive to the apparent lessening of immediate tension in the Far East but are not entirely satisfied to risk paying premiums over the government buying price, accounting for the active interest in March metal and that already afloat to this country.

February Averages

Average prices of the major non-ferrous metals in February, based on quotations appearing in THE IRON AGE, were as follows:

	Per Lb.
Electrolytic copper, Conn. Valley	12.00c.*
Lake copper, Eastern delivery	12.00c.
Straits tin, spot, New York	51.41c.
Zinc, East St. Louis	7.25c.
Zinc, New York	7.64c.
Lead, St. Louis	5.45c.
Lead, New York	5.60c.

*Mine producers only.

(Non-ferrous prices on page 119)

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Scrap . . . MARKET ACTIVITIES AND QUOTATION TRENDS

• • • **A telegram** was sent to leading scrap brokers last week by the Institute of Scrap Iron and Steel stating it to be the "suggestion" of the Price Stabilization Division of the National Defense Commission that bids on March railroad lists shall not exceed $21 for No. 1 railroad heavy melting steel, $22 for scrap rails, $23.50 for rerolling rails and $24 for scrap rails 3 ft. and under. The railroad heavy melting steel price is the same as that suggested for February lists, but the scrap rail price is $2 lower and the rerolling rail price is $2.50 lower. This is the first time that a price has been suggested on rails 3 ft. and under.

C. A. Bishop of the Price Stabilization Division has worked out a series of differentials on various grades of scrap and for various districts, to be built around a $20 Pittsburgh price for No. 1 steel, and these have been submitted to scrap brokers and dealers, steel mills and others for their comment. The differentials suggested are based on a study of prices quoted in THE IRON AGE. The differentials adopted may not adhere strictly to normal spreads. For example, the study showed that scrap rails were usually about 50c. a ton over No. 1 railroad heavy melting steel at Pittsburgh, but a spread of $1 was adopted in the suggestions for March bids on railroad lists. Suggestions must be returned to the division by next Saturday.

THE IRON AGE composite price for steel scrap was raised slightly due to the reduction in Chicago's spread, $19 to $19.50, to a flat $19.50 for heavy melting steel and returns to $20.17, the level of Feb. 4. Prices on the whole continue stable, but in some instances, as particularly Detroit and Philadelphia, cast and secondary steel scrap grades have advanced, while the primary grades are unchanged. The reason for this seems to lie in a large measure in the increased attention mills have to pay to secondary grades as supplies of No. 1 and 2 steel are mostly inadequate. Cast grades continue to be very scarce and greatly in demand. Only the South seems to be an exception in an undersupplied market.

Pittsburgh

Little or no buying is taking place, prices are still partially nominal, and both buyers and sellers are awaiting action on product and district differentials. Recommendations for product differentials are being discussed this week. Steel makers are depleting supplies of scrap on hand and, if this practice continues much longer, subsequent buying will have to be on an accelerated and continuous basis. Railroad lists will bring those prices "suggested" by Washington.

Chicago

Supply of scrap has not loosened here. Railroad and industrial scrap comes out steadily but in comparatively small quantities. Foundry material is still in a very tight position. Some of the railroads do not appear to be anxious to sell scrap to present markets. The effect of Washington's last price announcement governing Pittsburgh has interests here wondering what will be done about differentials for other districts. More small dealers are drying up as scrap sources. Prices experienced little change during the past week as all concerned seemed to "watch and wait." Rerolling rails have not been sold since the request for a "ceiling" price was received. The price here remains nominal.

Philadelphia

Awaiting further developments on the question of differentials, this market remains in an unsettled and unsatisfactory condition. The flow of scrap has not diminished greatly but its present rate is not sufficient to support present capacity operations at district mills and consumers are worried about having to supplement shipments regularly from stockpiles. Willingness of buyers to accept secondary grades in the absence of prime material has strengthened these grades. Cast grades have also stiffened. Old bundles are quoted at $17 to $17.50, machine shop turnings, $15 to $15.50. Heavy breakable, cupola, and mixed yard cast are up, the latter item, $1.50. Cast borings are up $1.

Youngstown

Aside from a revision in machine shop turnings, the market shows no change here this week in published quotations. Better weather has contributed a little toward a freer flow of scrap but the change is of nowhere near the proportions required to satisfy mill buyers.

Cleveland

Aside from one or two minor changes, for the purpose of better alinement, the market is unchanged here this week and awaiting the closing of the principal railroad list Thursday.

Buffalo

The scrap supply here is admittedly becoming tighter every week, although a letup in severe weather conditions helped in some degree to bring out supplies. Cast scrap demand is very strong and the supply scarce. Dealers' yard supplies are low and there is speculation as to what turn the market situation may take this month. Shoveling turnings are up 50c. over last week's quotation. Sales of cast iron borings are reported within the range of $14.50 to $15 a ton.

Cincinnati

Inconsistencies in the scrap prices are keeping dealers on edge. With ceilings set by the government on steel grades, some expansion in the cupola material is expected. Mills are taking any scrap that is offered, but available material continues to be restricted. Price schedules are unchanged, but are viewed as purely nominal.

Detroit

A combination of pressures too great to be resisted any longer has created considerable price movement in the Detroit area with the result that a majority of grades of scrap are being quoted at higher levels this week. Predominant in the local situation is a demand for blast furnace grades of scrap and foundry materials, with scarcity apparent in both classifications. Only the important open-hearth grades have been able to resist the upward price movement. However, even the open-hearth grades have been sold for moderately higher prices in some transactions. Specialties of all sorts, blast furnace grades and foundry scrap are advancing on a wide front, so quotations in many instances do not represent the maximum.

New York

There is still considerable conflict in this area as to the exact level of No. 1 steel. While some offers are as low as $16, all transactions are at $16.50 .Therefore the quotation has been raised to a flat $16.50. Material is coming out very slowly and dealers' yard stocks are extremely low. Small scrap collectors are taking more lucrative jobs. Cast scrap continues to be particularly tight against heavy demands.

Boston

Scrap is not coming out as rapidly as anticipated, which lends color to trade talk of a pinch in supplies of everything but automobile scrap. Prices are holding firmly at previously established levels. Bundled skeleton or busheling is moving at $13.25 to $13.65 a ton f.o.b., generally at $13.25 to $13.50, which brings the delivered to Pennsylvania consumer cost up to around $20.50 a ton.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	....	$21.00
Railroad heavy mltng.	$21.00 to	21.50
No. 2 heavy melting...	....	20.00
Railroad scrap rails...	22.00 to	22.50
Rails 2 ft. and under..	26.50 to	27.00
Comp. sheet steel.....	....	21.00
Hand bundled sheets.	19.50 to	20.00
Heavy steel axle turn.	19.50 to	20.00
Heavy steel forge turn.	18.50 to	19.00
Machine shop turnings	15.50 to	16.00
Short shov. turn. alloy free	17.00 to	17.50
Mixed bor. & turn.....	17.00 to	17.50
Cast iron borings.....	17.50 to	18.00
Cast iron carwheels...	23.00 to	23.50
Heavy breakable cast.	19.00 to	19.50
No. 1 cupola cast.....	22.00 to	22.50
RR. knuckles & coup.	26.00 to	26.50
Rail coil springs	27.00 to	27.50
Rail leaf springs	27.00 to	27.50
Rolled steel wheels....	27.00 to	27.50
Low phos. billet crops.	26.50 to	27.00
Low phos. punchings.	26.50 to	27.00
Low phos. heavy plate.	25.50 to	26.00
Railroad malleable ...	26.00 to	26.50

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	....	$20.00
No. 2 hvy. mltng. steel.	....	18.50
Hydraulic bund., new.	....	20.00
Hydraulic bund., old..	$17.00 to	17.50
Steel rails for rolling..	....	23.50
Cast iron carwheels..	....	23.00
Hvy. breakable cast..	22.50 to	23.00
No. 1 cupola cast	24.00 to	25.00
Mixed yard (f'd'y) cast	22.00 to	22.50
Stove plate (steel wks.)	19.50 to	20.00
Railroad malleable ...	23.50 to	24.00
Machine shop turn....	15.00 to	15.50
No. 1 blast furnace....	....	14.00
Cast borings	17.00 to	17.50
Heavy axle turnings..	....	19.50
No. 1 low phos. hvy...	26.00 to	26.50
Couplers & knuckles..	26.00 to	26.50
Rolled steel wheels....	26.00 to	26.50
Steel axles	25.00 to	25.50
Shafting	25.00 to	25.50
Spec. iron & steel pipe	18.00 to	18.50
Cast borings (chem.)...	....	17.50

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton	
Hvy. mltng. steel.....	....	$19.50
Auto. hvy. mltng. steel alloy free	$18.00 to	18.50
No. 2 auto. steel.....	16.00 to	16.50
Shoveling steel	19.00 to	19.50
Factory bundles	18.50 to	19.00
Dealers' bundles	17.50 to	18.00
No. 1 busheling	18.00 to	18.50
No. 2 busheling, old...	10.50 to	11.00
Rolled carwheels	22.25 to	22.75
Railroad tires, cut	23.00 to	23.50
Railroad leaf springs..	22.50 to	23.00
Steel coup. & knuckles	22.50 to	23.00
Axle turnings	18.25 to	18.75
Coil springs	24.00 to	24.50
Axle turn. (elec.).....	19.75 to	20.00
Low phos. punchings..	23.00 to	23.50
Low phos. plates 12 in. and under	23.25 to	23.75
Cast iron borings.....	14.00 to	14.50
Short shov. turn.....	14.00 to	14.50
Machine shop turn....	13.75 to	14.25
Rerolling rails	....	23.50
Steel rails under 3 ft..	23.00 to	23.50
Steel rails under 2 ft..	24.00 to	24.50
Angle bars steel	23.00 to	23.50
Cast iron carwheels...	20.00 to	20.50
Railroad malleable ...	23.50 to	24.00
Agric. malleable	17.50 to	18.00
	Per Net Ton	
Iron car axles	$23.50 to	$24.00
Steel car axles	24.50 to	25.00
Locomotive tires	18.00 to	18.50
Pipes and flues	14.00 to	14.50
No. 1 machinery cast..	19.50 to	20.00
Clean auto. blocks....	18.50 to	19.00
No. 1 railroad cast....	17.75 to	18.25
No. 1 agric. cast.....	16.50 to	17.00
Stove plate	13.75 to	14.25
Grate bars	14.00 to	14.50
Brake shoes	14.25 to	14.75

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$20.50 to	$21.50
No. 2 hvy. mltng. steel	19.25 to	20.25
Low phos plate	24.00 to	24.50
No. 1 busheling	20.00 to	20.50
Hydraulic bundles	20.25 to	21.25
Machine shop turn.....	15.50 to	16.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$20.00 to	$21.00
No. 2 hvy. mltng. steel.	19.00 to	20.00
Comp. sheet steel	$19.50 to	$20.50
Light bund. stampings	15.00 to	15.50
Drop forge flashings...	18.00 to	18.50
Machine shop turn....	13.50 to	14.00
Short shov. turn.....	14.75 to	15.25
No. 1 busheling	19.25 to	19.75
Steel axle turnings...	19.50 to	20.00
Low phos. billet and bloom crops	24.50 to	25.00
Cast iron borings.....	16.25 to	16.75
Mixed bor. & turn.....	16.25 to	16.75
No. 2 busheling	16.25 to	16.75
No. 1 machinery cast.	24.00 to	24.50
Railroad cast	23.00 to	23.50
Railroad grate bars ...	15.00 to	15.50
Stove plate	15.00 to	15.50
Rails under 3 ft.....	26.00 to	27.00
Rails for rolling.....	26.00 to	26.50
Railroad malleable ...	24.50 to	25.00

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$20.50 to	$21.00
No. 2 hvy. mltng. steel.	18.50 to	19.00
Scrap rails	22.00 to	22.50
New hvy. b'ndled sheets.	18.00 to	18.50
Old hydraul. bundles..	17.00 to	17.50
Drop forge flashings..	18.00 to	18.50
No. 1 busheling	18.00 to	18.50
Machine shop turn....	13.50 to	14.00
Shov. turnings	16.00 to	16.50
Mixed bor. & turn....	14.50 to	15.00
Cast iron borings.....	14.50 to	15.00
Knuckles & couplers..	25.00 to	25.50
Coil & leaf springs....	25.00 to	25.50
Rolled steel wheels...	25.00 to	25.50
No. 1 machinery cast..	21.50 to	22.00
No. 1 cupola cast.....	20.00 to	20.50
Stove plate	17.50 to	18.00
Steel rails under 3 ft..	27.00 to	27.50
Cast iron carwheels...	20.50 to	21.50
Railroad malleable ...	24.00 to	24.50
Low phos. plate	26.50 to	27.00

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting.	$18.00 to	$18.50
No. 1 hvy. melting....	17.50 to	18.00
No. 2 hvy. melting....	16.50 to	17.00
No. 1 locomotive tires	19.50 to	20.00
Misc. stand. sec. rails.	19.50 to	20.00
Railroad springs	21.50 to	22.00
Bundled sheets	12.50 to	13.00
Cast bor. & turn.....	10.00 to	10.50
Machine shop turn.....	10.75 to	11.25
Heavy turnings	13.50 to	14.00
Rails for rerolling	21.50 to	22.00
Steel car axles	25.00 to	25.50
No. 1 RR wrought....	14.00 to	14.50
No. 2 RR. wrought....	16.00 to	16.50
Steel rails under 3 ft..	23.50 to	24.00
Steel angle bars	21.25 to	21.75
Cast iron carwheels...	21.00 to	21.50
No. 1 machinery cast.	19.50 to	20.00
Railroad malleable	20.00 to	21.00
Breakable cast	17.50 to	18.00
Stove plate	15.00 to	15.50
Grate bars	14.00 to	14.50
Brake shoes	13.50 to	14.00

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel.	$18.25 to	$18.75
No. 2 hvy. mltng. steel.	16.25 to	16.75
Scrap rails for mltng.	23.25 to	23.75
Loose sheet clippings.	12.75 to	13.25
Hyd'lic bundled sheets	17.00 to	17.50
Cast iron borings	9.25 to	9.75
Machine shop turn....	10.00 to	10.50
No. 1 busheling	14.25 to	14.75
No. 2 busheling	7.75 to	8.25
Rails for rolling	24.50 to	25.00
No. 1 locomotive tires.	20.25 to	20.75
Short rails	26.25 to	26.75
Cast iron carwheels..	18.75 to	19.25
No. 1 machinery cast..	22.25 to	22.75
No. 1 railroad cast...	20.50 to	21.00
Burnt cast	12.75 to	13.25
Stove plate	12.75 to	13.25
Agricul. malleable	18.00 to	18.50
Railroad malleable ...	21.00 to	21.50
Mixed hvy. cast.	19.25 to	19.75

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting steel	....	$18.00
No. 2 hvy. melting steel	....	17.00
No. 1 busheling	....	16.00
Scrap steel rails	....	18.00
Steel rails under 3 ft..	....	20.00
Rails for rolling.....	....	19.00
Long turnings	....	9.50
Cast iron borings	....	8.50
Stove plate	....	13.50
Steel axles	....	18.00
No. 1 RR. wrought....	....	16.00
No. 1 cast	....	18.50
No. 2 cast	....	13.50
Cast iron carwheels...	....	19.00
Steel carwheels	....	18.00

DETROIT

Dealers' buying prices per gross ton, f.o.b. cars:

No. 1 heavy melting..	$16.25 to	$16.75
No. 2 heavy melting..	15.25 to	15.75
Borings and turnings.	12.50 to	13.00
Machine shop turnings.	11.50 to	12.00
Long turnings	10.00 to	10.50
Short shov. turnings.	12.50 to	13.00
No. 1 cast	20.00 to	20.50
Automotive cast	20.50 to	21.00
Hvy. breakable cast..	16.50 to	17.00
Stove plate	12.50 to	13.00
Hydraul. comp. sheets.	17.75 to	18.25
New busheling	16.75 to	17.25
Sheet clips	13.75 to	14.25
Flashings	17.00 to	17.50
Low phos. plate	19.00 to	19.50

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel.	....	$16.50
No. 2 hvy. mltng. steel	$15.00 to	15.50
Hvy. breakable cast...	18.50 to	19.00
No. 1 machinery cast.	19.00 to	19.50
No. 2 cast	17.50 to	18.00
Stove plate	15.50 to	16.00
Steel car axles	23.50 to	24.00
Shafting	20.00 to	20.50
No. 1 RR wrought....	17.50 to	18.00
No. 1 wrought long....	17.00 to	17.50
Spec. iron & steel pipe	13.00 to	13.50
Rails for rolling.....	19.50 to	20.00
Clean steel turnings*	10.00 to	10.50
Cast borings*	11.00 to	11.50
No. 1 blast furnace...	9.00 to	9.50
Cast borings (chem.)..	11.00 to	11.50
Unprepared yard scrap	9.50 to	10.00
Light iron	7.00 to	7.50

Per gross ton delivered local foundries:

No. 1 machin. cast....	$21.00 to	$22.00
No. 2 cast	18.00 to	18.50

* $1.50 less for truck loads.

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars:

Breakable cast	$17.00 to	$17.25
Machine shop turn....	9.50 to	10.00
Mixed bor. & turn.....	9.25 to	9.75
Bun. skeleton long	13.25 to	13.65
Shafting	19.25 to	19.50
Stove plate	14.00 to	14.25
Cast bor. chemical....	11.00 to	11.25

Per gross ton delivered consumers' yards:

Textile cast	$22.00 to	$24.50
No. 1 machine cast....	22.00 to	24.00

Per gross ton delivered dealers' yards:

Unprepared yard scrap.	$11.00 to	$12.15

PACIFIC COAST

Per net ton delivered to consumer:

	San Fran.	Los Ang.	Seattle
No. 1 hvy. mltng. steel	Nominal		
No. 2 hvy. mltng. steel			
Bundles			

CANADA

Dealers' buying prices at these yards, per gross ton:

	Toronto	Montreal
Low phos. steel.....	$14.00	$13.50
Specialty steel	15.00	14.50
No. 1 heavy mltng. steel	12.50	12.00
No. 2 heavy mltng steel	10.50	10.00
Mixed dealers' steel....	9.50	9.00
Drop forge flashings....	10.50	10.00
New loose clippings....	8.75	8.25
Busheling	7.50	7.00
Scrap pipe	8.75	8.25
Steel turnings	9.00	8.50
Cast borings	9.00	8.50
Machinery cast	24.75	24.00
Dealers' cast	22.50	22.00
Stove plate	19.50	19.00

EXPORT

Dealers' buying prices per gross ton:

	New York, truck lots, delivered barges
No. 1 hvy. mltng. steel	$16.50
No. 2 hvy. mltng. steel.	15.50
No. 2 cast	18.00
Stove plate	16.00
Boston on cars at Army Base or Mystic Wharf	
No. 1 hvy. mltng. steel.	$17.25
No. 2 hvy. mltng. steel	15.75
Rail (scrap)	$17.25 to 17.50

Construction Steel

. . .STRUCTURAL STEEL, REINFORCING BARS, PLATES, PILING, ETC.

Fabricated Steel

Lettings dropped to 11,100 tons from 33,575 tons last week; new projects lower at 20,925 tons; plate awards only 360 tons.

AWARDS

NORTH ATLANTIC STATES

2740 Tons, Beaver, Pa., factory and boiler house for Curtiss-Wright Corp., to American Bridge Co., Pittsburgh.

1000 Tons, Bath, Me., storage and welding building for Bath Iron Works, to Bethlehem Steel Co., Bethlehem, Pa.

740 Tons, Deer Park, Long Island, power house, building No. 35, to Belmont Iron Works, Philadelphia.

600 Tons, McKeesport, Pa., State highway viaduct, to American Bridge Co., Pittsburgh.

415 Tons, Niagara Falls, N. Y., addition to low carbon chrome building for Vanadium Corp. of America, to Bethlehem Steel Co., Bethlehem, Pa.

400 Tons, New York, municipal asphalt plant, to Lehigh Structural Steel Co., Allentown, Pa., through F. D. Cummer & Sons Co., Cleveland.

250 Tons, New York, widening Grand Concourse bridge for city, to American Bridge Co., Pittsburgh.

225 Tons, Reading, Pa., pickling building for Parish Pressed Steel Co., to Belmont Iron Works, Philadelphia.

200 Tons, Golden Ring, Md., State highway bridge, to American Bridge Co., Pittsburgh.

130 Tons, Quonset Point, R. I., bulkhead extension, Naval base, to Phoenix Bridge Co., Phoenixville, Pa.

125 Tons, Neville Island, Pa., bear trap repair parts for U. S. Engineer's Office, to American Bridge Co., Pittsburgh.

105 Tons, Boston, repairs to bridge 0.87 for New York, New Haven & Hartford Railroad, to Berlin Construction Co., Berlin, Conn.

100 Tons, Buffalo, plant extension for Worthington Pump & Machinery Corp., to Austin Co., Cleveland.

THE SOUTH

630 Tons, Jefferson City, Tenn., power house and spillway operating bridge, Cherokee Dam, for TVA, to American Bridge Co., Pittsburgh.

588 Tons, Pensacola, Fla., three hangars for Navy, to Ingalls Iron Works Co., Birmingham.

322 Tons, Dallas, Tex., State highway bridge, to Central Texas Iron Works, Waco, Tex.

218 Tons, Morgan County, Ky., State bridge, to American Bridge Co., Pittsburgh.

CENTRAL STATES

575 Tons, Illinois, Iowa and Wisconsin, repairs to 12 bridges for Milwaukee Road, to American Bridge Co., Pittsburgh.

236 Tons, Hilliard, Mo., two girder spans for Missouri Pacific Railway, to American Bridge Co., Pittsburgh.

208 Tons, Mansfield, Ohio, addition to warehouse for Westinghouse Electric & Mfg. Co., to Mansfield Structural & Erecting Co.

150 Tons, Dearborn, Mich., State bridge B-1 of 82-3-15, C-2, to American Bridge Co., Pittsburgh.

108 Tons, Euclid, Ohio, building for Euclid Road Machinery Co., to Kilroy Structural Steel Co., Cleveland.

WESTERN STATES

600 Tons, Wilmington, Cal., California Shipbuilding Co. warehouse, to Consolidated Steel Corp., Los Angeles.

400 Tons, Portland, Ore., Pennsylvania Salt Co. plant, to Poole & McGonigle, Portland, through Allen & Earley, Inc., Tacoma, Wash., contractor.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

2600 Tons, Nicetown, Philadelphia, No. 3 press plant building for Midvale Co.

1200 Tons, Philadelphia, runway for open-hearth cranes for Navy.

950 Tons, various locations, bridges for Baltimore & Ohio Railroad Co.

700 Tons, Philadelphia, crane runway for Drydock Associates, Inc.

650 Tons, Buffalo, plant extension for Sterling Engine Co., readvertising for bids.

600 Tons, Loop, Pa., girder spans for Baltimore & Ohio Railroad Co.

500 Tons, Camden, N. J., sheet metal shop annex for New York Shipbuilding Corp.

375 Tons, New York, apartment house for Arthur Weiser.

370 Tons, Middlesex County, N. J., grade crossing elimination.

325 Tons, Bendix, N. J., manufacturing building for Air Associates, Inc.

270 Tons, Washington, Fayette Counties, Pa., highway bridge, bids March 7.

225 Tons, Conshohocken, Pa., chemical plant for Quaker Chemical Products Corp.

210 Tons, New Haven, Conn., building for National Folding Box Co.

175 Tons, East Rutherford, N. J., office building for Flintkote Co.

160 Tons, Reading, Pa., factory building, Reading Sheet Metal Products Co., bids March 4.

150 Tons, Greenwich, Conn., boiler plant and laundry building for Greenwich Hospital.

150 Tons, Brighton, Mass., Coca-Cola Bottling Co. plant and truck storage.

140 Tons, Torrington, Conn., building for Torrington Mfg. Co.

130 Tons, Quonset Point, R. I., channel walers for Navy.

120 Tons, Brooklyn, enclosed retail market.

THE SOUTH

1600 Tons, Morristown-Bear Station, Tenn., Holston River bridge for TVA.

675 Tons, Gilbertsville, Ky., TVA bridge over Kentucky Dam.

675 Tons, Hopewell, Va., buildings for Solvay Process Co.

250 Tons, Wytheville, Va., plant addition, Wytheville Machine Works, bids March 4.

CENTRAL STATES

1800 Tons, Chicago, boiler and turbine rooms, unit No. 18, Fisk Station, for Commonwealth Edison Co.

1000 Tons, Cincinnati, factory building for King Machine Tool Co.

925 Tons, Green Bay, Wis., addition to Bayside Station, for Wisconsin Public Service Corp.

750 Tons, Camp Funston, Kan., two overpasses for Government.

200 Tons, Washtenaw County, Mich., manufacturing building for King-Seeley Corp.

100 Tons, Cleveland, building for Kraft Cheese Co.

WESTERN STATES

2700 Tons, Long Beach, Cal., assembly shop for Government.

250 Tons, Nyssa, Ore., dried pulp warehouse for Amalgamated Sugar Co.

FABRICATED PLATES

AWARDS

360 Tons, Brooklyn, gasholder, contract 5, Coney Island sewage plant, to Pacific Flush Tank Co., New York.

PENDING PROJECTS

200 Tons, Arlington, Mass., Massachusetts water division 24 in. steel pipe and connections.

SHEET PILING

AWARDS

190 Tons, Cleveland, dock for Sherwin Williams Co., to Bethlehem Steel Co., Bethlehem, Pa., through Merritt, Chapman & Scott, contractors.

PENDING PROJECTS

475 Tons, Toledo, dock for Standard Oil Co. of Ohio. Great Lakes Dredge & Dock Co., Cleveland, general contractor.

Reinforcing Steel

Awards of 14,400 tons; 3,750 tons in new projects.

AWARDS

ATLANTIC STATES

760 Tons, Brooklyn, requirements of Naval receiving barracks, to Truscon Steel Co., Youngstown, through White Construction Co., Brooklyn.

200 Tons, McKeesport, Pa., highway project, to Truscon Steel Co., Youngstown, through Midwest Construction & Asphalt Co.

150 Tons, Brooklyn, Kollmorgan Optical Co. building, to Capitol Steel Corp., New York.

125 Tons, Providence, R. I., addition to Brier Mfg. Co., to Truscon Steel Co., Youngstown.

100 Tons, Niagara Falls, N. Y., municipal airport, to Bethlehem Steel Co., Bethlehem, Pa.

Weekly Bookings of Construction Steel

Week Ended ——→	Mar. 4, 1941	Feb. 25, 1941	Feb. 4, 1941	Mar. 5, 1940	Year to Date 1941	Year to Date 1940
Fabricated structural steel awards	11,100	33,525	30,450	36,100	298,025	164,410
Fabricated plate awards	360	2,900	4,930	170	26,305	25,250
Steel sheet piling awards	190	1,200	295	0	4,640	6,275
Reinforcing bar awards	14,400	8,650	11,350	9,950	93,690	66,970
Total Letting of Construction Steel	26,050	46,275	47,025	46,220	422,660	262,905

SOUTH AND CENTRAL

3400 Tons, Dublin, Va., Hercules Powder Co. bag and ammunition storage plant, Mason & Hanger, contractor, distributed approximately as follows: 1000 tons to Concrete Steel Co., New York; 1000 tons to Truscon Steel Co., Youngstown, and 1400 tons to Carnegie-Illinois Steel Corp., Pittsburgh.

400 Tons, Franklin County, Ky., George T. Stagg Co. warehouse, to Pollak Steel Co., Cincinnati, through F. Messer & Son.

338 Tons, Port Huron, Mich., Detroit Edison Co., to Truscon Steel Co., Youngstown.

280 Tons, Fort Wayne, Ind., U. S. Army airport, to Great Lakes Steel Corp., Detroit, through Cooke Contracting Co., contractor.

270 Tons, Cincinnati, purchasing department, to Pollak Steel Co., Cincinnati.

220 Tons, Columbus, Ga., Peabody housing project, to Truscon Steel Co., Youngstown, through Paul Bros.

200 Tons, Peoria, Ill., Harrison Homes housing project, to Laclede Steel Co., St. Louis, through P. Warren Construction Co., contractor.

150 Tons, Columbus, Ohio, mesh for WPA, to Bethlehem Steel Co., Bethlehem, Pa., through O. W. Merritt Supply Co.

145 Tons, Rosville, Ga., Peerless Woolen Mill, to Truscon Steel Co., Youngstown, through Patson Cook Co.

WESTERN STATES

4000 Tons, Denver, Remington Arms Co. small arms plant, to Colorado Fuel & Iron Co., Denver.

575 Tons, Friant, Cal., Friant Dam (Invitation 48,759-A), to Columbia Steel Co., San Francisco.

160 Tons, Los Angeles, Gilmore Village store, to Ceco Steel Products Co., Los Angeles.

145 Tons, Stevens County, Wash., highway project, to Truscon Steel Co., Youngstown, through Sam Orini.

105 Tons, San Diego, Cal., additions to music and science buildings, State College, to Consolidated Steel Corp., Los Angeles.

100 Tons, Portland, Ore., Pennsylvania Salt Co. plant, to Mercer Steel Co., Portland, through Allen & Earley, Tacoma, Wash., contractor.

100 Tons, Los Angeles, city Schedule 4191, to Soule Steel Co., Los Angeles.

NEWFOUNDLAND

2000 Tons, Argentia, Newfoundland, Naval air base, to Jones & Laughlin Steel Corp., through George A. Fuller, and Merritt, Chapman & Scott, New York, contractors.

CANAL ZONE

441 Tons, Panama Canal, schedule 4815, to Republic Steel Corp, Cleveland.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

700 Tons, New York, municipal asphalt plant; Lane Construction Co., contractor.

600 Tons, Boston, Navy Yard pier; Fitzgerald Construction Co., contractor.

400 Tons, Philadelphia, runways for Cramp Shipbuilding Corp.; bids March 6.

300 Tons, Elizabethport, N. J., Singer Mfg. Co. plant; Austin Co., contractor.

250 Tons, Indianhead, Md., duPont Naval powder plant.

SOUTH AND CENTRAL

400 Tons, Narrows, Va., plant for Celanese Corp. of America.

350 Tons, Jefferson City, Mo., hotel; E. A. Brunson Construction Co., St. Louis, general contractor.

200 Tons, Milwaukee, Naval armory.

140 Tons, Warren, Ohio, housing project; Charles Shutramp & Sons general contractor.

WESTERN STATES

2265 Tons, Los Angeles, Los Angeles River improvement, section V (Invitation 100); bids March 27. Project previously reported with indefinite bid date.

390 Tons, Reno, Nev., University of Nevada gymnasium; bids in.

Pipe Lines

Pine Mountain Fuel Gas Corp., Middlesboro, Ky., plans welded steel pipe line from gas field in Knox County, Ky., to Middlesboro, for natural gas transmission for local distribution; also will install pipe line distribution system in municipality, with control station and other operating facilities. Work will be carried out early in spring.

Metropolitan Utilities District, Eighteenth and Harney Streets, Omaha, Neb., has authorized new 16-in. pressure pipe line from Twenty-ninth and Harney Streets to Burt and Thirtieth Streets for gas transmission. Cost about $50,000.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until March 20 for steel pipe; also for steel tubing and wrought iron pipe, all for Eastern and Western yards (Schedule 5571).

Chattanooga Gas Co., 811 Broad Street, Chattanooga, Tenn., plans pressure pipe line extensions in natural gas distribution system, close to 18 miles in all. Cost about $275,000.

Lion Oil Refining Co., Eldorado, Ark., plans new welded steel pipe line from gas field in Columbia County, Ark., to connection with pipe line to refinery at first noted place, for natural gas fuel service in power house. A compressor station will be built at Magnolia, Ark., for booster service. Shell Oil Co., Shell Building, St. Louis, is interested in project and will secure natural gas supply from same district for new recycling plant in Union County, Ark.

Kentucky & West Virginia Gas Co., 231 South LaSalle Street, Chicago, P. C. Van Gilst, vice-president in charge of operation, plans welded steel pipe line from gas field in Floyd County, Ky., to point in northern part of West Virginia, about 200 miles distant, for natural gas transmission. Connection will be made in latter district with existing main pipe line of company, serving different parts of northern West Virginia and western Pennsylvania. Cost over $2,000,000 with booster stations and other operating facilities.

Socony-Vacuum Oil Co., Inc., 26 Broadway, New York, plans new welded steel pipe line from connection with recently completed pipe line between oil refinery at Buffalo and Syracuse, N. Y., to Ithaca and Elmira, N. Y., over 80 miles, for gasoline transmission to distribution plants in two last mentioned cities, providing direct pipe line connection between these two points and Buffalo refinery. Buffalo offices are at 500 Elk Street.

Shell Oil Co., San Francisco, will take bids within 30 days for a 90-mile, 10-in. oil pipe line between Ventura and Wilmington, Cal.

Paradise Irrigation District, Paradise, Butte County, Cal., will take bids March 12 for 20,000 ft. of 4-in., 15,200 ft. of 6-in., 14,300 ft. of 8-in., 4500 ft. of 10-in., 1200 ft. of 12-in. and 5000 ft. of 14-in. outside diameter steel pipe and miscellaneous valves, fittings, and specials.

Cast Iron Pipe

Mansfield, La., asks bids until March 11 for pipe line extensions in water system; also for new natural gas engine generator unit, with accessories and pumping machinery, with capacity of 1000 gal. per min., for pumping station. J. B. McCrary Co., Inc., Atlanta, Ga., is consulting engineer.

Velasco, Tex., plans pipe lines for water system and other waterworks installation. Bond issue is being arranged for this and sewage system. Garrett Engineering Co., 918 Richmond Street, Houston, Tex., is consulting engineer.

Water Supply District No. 1, St. Louis County, Clayton, Mo., care of Robert Francis Denny Co., 8004 Bonhomme Street, St. Louis, engineer, plans pipe line extensions in water system in Washington and Concord School Districts. Cost about $40,000. Bond issue in that amount is being arranged.

Board of Water and Sewage Commissioners, Stevens Point, Wis., will take bids early in April for about 4000 ft. of 5-in. pipe for water system, including fittings.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until March 13 for about 11,000 ft. of cast iron soil pipe for Eastern Navy yards, 8100 ft. of similar pipe for Mare Island yard, 9500 ft. for Eastern or Western yards, and 420 ft. for Norfolk, Va., yard (Schedule 5566).

Kingsburg, Cal., plans pipe lines for water system and other waterworks installation. Bond issue of $33,000 has been authorized for this and sewage system lines.

Water Department, Tampa, Fla., has engaged Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., consulting engineer, to make surveys and plans for extensions in water system, including new main line from pumping station on Hillsborough River, duplicating an existing line; and extensions and replacements in distribution lines in different parts of city. Cost about $1,750,000.

San Diego, Cal., will take bids March 11 for Pacific Beach pipe line involving 38,000 ft. of 16 and 18-in. cast iron pipe and fittings; alternate on asbestos-cement.

Seattle has taken bids on 7500 ft. of 12-in. and 1200 ft. of 16-in., Class 150 pipe.

Italy Opens Plant to Make Metallic Magnesium

• • • **A new plant** for the production of metallic magnesium from dolomite is reported to have been inaugurated recently at Bolzano, Italy, according to the Metals and Minerals Division, Department of Commerce. The plant, constructed jointly by three of the largest Italian metal companies, is equipped with a battery of electric furnaces and has a reported production capacity of 1200 tons annually.

Iron and Steel Exports By Countries in 1940

(Not Including Scrap)

(Gross Tons)

	United Kingdom	Canada	Argentina	Japan	Brazil	Union of S. Africa	Total, Incl. All Others
Jan.	45,675	43,966	37,735	26,623	24,113	8,471	396,064
Feb.	63,130	40,586	26,623	10,952	30,547	5,827	436,585
Mar.	78,828	46,266	47,859	22,174	35,563	7,118	457,052
Apr.	69,042	45,721	25,859	18,450	17,061	15,090	391,754
May	132,341	56,658	32,485	3,816	29,195	15,329	471,481
June	231,094	90,491	38,540	26,668	20,472	12,297	617,678
July	376,066	69,969	37,851	17,025	21,207	20,092	707,809
Aug.	653,866	108,017	37,156	66,829	14,443	22,859	1,046,084
Sept.	607,931	105,933	19,508	54,845	9,456	34,255	965,444
Oct.	461,489	122,723	14,179	45,599	11,242	17,825	846,584
Nov.	400,953	83,946	16,242	9,401	19,240	34,297	713,827
Dec.	362,366	70,774	11,364	85,752	22,260	23,097	735,178
Total	3,437,781	885,050	362,059	388,134	254,799	216,557	7,785,540

Note: Shipments to all countries other than those specifically named above included 104,378 tons to Chile; 137,127 tons to Venezuela; 142,745 tons to China; 164,306 tons to Netherlands Indies; 121,078 tons to the Philippines.

Prices of Finished Iron and Steel...

Steel prices on these pages are f.o.b. basing points (in cents per lb.) unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases freight absorbed to meet competition.

Basing Point → / ↓ Product	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	
Long ternes[2]	3.80¢		3.80¢									4.55¢			
Wrought iron	4.75¢														
STRIP															
Hot rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢		
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢		
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢								
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢		
TIN PLATE Standard cokes (Per 100-lb. base box)	$5.00	$5.00	$5.00						$5.10						
BLACK PLATE 29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ (10)			
TERNES, M'FG. Special coated (Per base box)	$4.30		$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢		
Reinforcing (rail)[7]	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢				2.40¢	2.45¢	2.15¢		
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70¢)						
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Coatesville and Claymont = 2.10¢)		2.45¢	2.65¢		2.29¢	2.15¢
Wrought iron	3.80¢														
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	
Alloy	3.50¢	3.50¢			(Coatesville = 3.50¢)										
SHAPES Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL C-R 0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
WIRE[9]															
Bright	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)								
Galvanized	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)								
Spring	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)								
PILING Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			
IRON BARS Common		2.25¢			(Terre Haute, Ind. = 2.15¢)										
Refined	3.75¢														
Wrought	4.40¢														

[1] Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to 29 gage within certain width and length limitations. [6] For merchant trade. [7] Straight lengths as quoted by distributers. [8] Also shafting. For quantities of 20,000 to 39,999 lb. [9] Carload lots to manufacturing trade. [10] Boxed.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are $2 higher f.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Shell Steel

Basic open hearth shell steel f.o.b. Pittsburgh and Chicago.

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity. This type of steel is for hot rolled sections used for the forging of shells and includes rounds, round squares, and special sections.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)	*Per Lb.*
Pittsburgh, Chicago, Cleveland.	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 4/64 in., $3 a net ton higher. Quantity extras apply.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh; Package, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00
25-lb. coating I.C.	8.00	16.00
30-lb. coating I.C.	8.63	17.25
40-lb. coating I.C.	9.75	19.50

WIRE PRODUCTS

(To the Trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham)

	Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cut nails, carloads	3.85
	Base per 100 Lb.
Annealed fence wire	$3.05
	Base Column
Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	56
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

Note: Birmingham base same on above items, except spring wire.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine and carriage bolts:	
½ in. and smaller by 6 in. and shorter	68
9/16 and ⅝ in. by 6 in. and shorter	66
¾ to 1 in. by 6 in. and shorter	64
1⅛ in. and larger, all lengths	62
All diameters over 6 in. long	62
Lag, all sizes	65
Plow bolts	68½
Hot pressed nuts; c.p.c., t-nuts; square, hex., blank or tapped:	
½ in. and smaller	66
9/16 to 1 in. inclusive	63
1⅛ to 1½ in. inclusive	61
1⅝ in. and larger	60

On above items, excepting plow bolts, additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

Semi-fin. hexagon nuts	U.S.S.	S.A.E.
½ in. and smaller	66	70
9/16 to 1 in.	63	65
1⅛ in. through 1½ in.	61	62
1⅝ in. and larger	60	..

In full container lots, 10 per cent additional discount.

Stove bolts, packages, nuts loose	73 and 100
Stove bolts in packages, with nuts attached	73
Stove bolts in bulk	81

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York, lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.40

Small Rivets

(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 10

Cap and Set Screws

	Per Cent Off List
Milled hexagon head, cap screws, 1 in. dia. and smaller	50
Milled headless set screws, cut thread ¼ in. and larger	64
3/16 in. and smaller	73
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	68
Upset set screws, cup and oval points	74
Milled studs	52

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Feb. 26	Feb. 27	Feb. 28	Mar. 1	Mar. 3	Mar. 4
Copper, Electrolytic[1]	12.00	12.00	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00	12.00	12.00
Tin, Straits, New York[2]	51.375	51.125	51.25	....	51.25	51.25
Zinc, East St. Louis	7.25	7.25	7.25	7.25	7.25	7.25
Lead, St. Louis[3]	5.50	5.50	5.50	5.50	5.60	5.60

[1] Mine producers' quotations only, delivered Conn. Valley. Deduct ¼c. for approximate New York delivery price. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

Warehouse Products

Cents per lb., Delivered

	New York	Cleveland
Tin		
Straits pig	52.375	55.00
Copper		
Electro	12.75	14.00
Castings	12.50	13.50
H. R. Sheets*	20.12	20.12
Seamless tubes*	20.62	20.62
Brass		
Yellow sheets*	18.65	18.65
Yellow, rods*	13.67	13.67
Seamless tubes*	21.40	21.40
Zinc		
Slabs	Nom'al	Nom'al
Sheet, No. 9 casks	13.50	Nom'al
Lead		
American pig	6.65	6.25
Bar	8.60	8.75
Cut sheets	8.90	9.00
Antimony		
Asiatic	16.00	17.00
Aluminum		
Virgin, 99%	20.00	21.00
No. 1 remelt., 98-99%	18.00	18.50
Solder		
½ and ½	31.387	32.75
Babbitt		
Anti-friction grade	23.50	21.75

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their use.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper		
Hvy. crucible	10.50	11.125
Hvy. and wire	9.50	9.90
Light and bottoms	8.50	9.00
Brass		
Heavy	6.50	7.00
Light	5.50	6.25
No. 1 yel. turn	6.00	6.50
No. 1 red or compo. turnings	9.25	10.25
Hvy. Mach. compo	9.50	9.875
Lead		
Heavy	4.75	5.25
Aluminum		
Cast	Nom'l	Nom'l
Sheet	Nom'l	Nom'l
Zinc	Nom'l	Nom'l

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 17c.-18c. a lb.; No. 12 remelt No. 2, standard, 21-23c. a lb. NICKEL electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICKSILVER, $172, per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 13.25c. a lb.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33⅓; on brass sheets and rods, 40; on brass tubes, 33⅓, and copper tubes, 40.

ALLOY STEEL

Alloy Steel Blooms, Billets and Slabs

Base per gross ton, f.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem.....$54.00

Alloy Steel Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade..... 2.70c.
Delivered, Detroit ..... 2.80c.

S.A.E. Series Numbers	Alloy Differential, per 100 Lb.
2000 (1.5 Ni)	$0.35
2100 (1.5 Ni)	0.75
2300 (3.5 Ni)	1.70
2500 (5 Ni)	2.55
3100 Ni-Cr	0.70
3200 Ni-Cr	1.35
3300 Ni-Cr	3.80
3400 Ni-Cr	3.20
4100 Cr-Mo (0.15 to 0.25 Mo.)	0.55
4100 Cr-Mo (0.25 to 0.40 Mo.)	0.75
x4340 Cr-Ni-Mo	1.70
4340 Cr-Ni-Mo	1.85
4600 Ni-Mo (0.2-0.3 Mo, 1.5-2 Ni)	1.20
5100 (0.60-0.90 Cr)	0.35
5100 (0.80-1.10 Cr)	0.45
5100 Cr spring steel	0.15
52-100 Cr. (electric furnace)	2.60
6100 Cr-V bar	1.20
6100 Cr-V spring steel	0.85
C-V	0.85

The above differentials are for hot rolled finished products. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

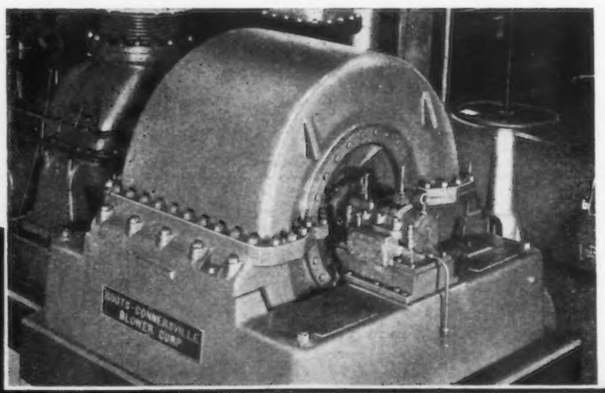
Base per pound, f.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. Delivered Detroit, 3.45c. carlots.

Alloy Steel Plates

Base per lb., f.o.b. Pittsburgh, Chicago and Coatesville.

Open hearth grade .....3.50c.

This steam turbine driven 24-inch 3-stage centrifugal exhauster of 1,210,000 cu. ft. per hour capacity handles 0.375 specific gravity gas at 4 lbs. pressure in Indiana coke plant.



CENTRIFUGAL EXHAUSTERS *for Coke Oven Service*

Centrifugal Exhausters as built by Roots-Connersville are backed by years of general air and gas handling experience and many years of specialized engineering experience in the designing and building of centrifugal exhausters for coke oven applications. These modern exhausters meet today's demand for new high levels of sustained production.

In your plant expansion or modernization program, get the benefit of the latest improved designs in centrifugal exhauster construction by consulting Roots-Connersville Blower Corporation, an organization that is in a position to recommend and deliver the unit that meets your particular need. We build both rotary positive and centrifugal types of equipment.

Centrifugal Blower and Exhauster Bulletin No. 120-B-11 may answer important questions for you. Ask for your copy.

IN HANDLING AIR AND GAS *Experience Counts* SINCE 1854

Roots CONNERSVILLE BLOWER CORPORATION

103 OHIO AVENUE CONNERSVILLE, IND.

NEW YORK CHICAGO POTTSTOWN, PA. SAN FRANCISCO
DETROIT ST. LOUIS LOS ANGELES PITTSBURGH BOSTON

STAINLESS AND HEAT-RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chromium-Nickel

No.	304	302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium

No.	410	430	442	446
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
H'tstrip	17.00c.	17.50c.	24.00c.	35.00c.
C'ld st.	22.00c.	22.50c.	32.00c.	52.00c.

20% Chromium-Nickel Clad Steel

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

TOOL STEEL

(F.o.b. Pittsburgh)

	Base per Lb.
High speed	67c.
High-carbon-chromium	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

ELECTRICAL SHEETS

(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. dock, San Francisco or Los Angeles or Seattle	56.00

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld, Hot Rolled
1 in. o.d. 13 B.W.G.	$9.01	$7.82	....
1¼ in. o.d. 13 B.W.G.	10.67	9.26	....
1½ in. o.d. 13 B.W.G.	11.70	10.23	$9.72
1¾ in. o.d. 13 B.W.G.	13.42	11.64	11.06
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2¼ in. o.d. 13 B.W.G.	16.76	14.54	13.79
2¼ in. o.d. 12 B.W.G.	18.45	16.01	15.16
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
2¾ in. o.d. 12 B.W.G.	21.42	18.59	17.54
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66
4½ in. o.d. 10 B.W.G.	43.04	37.35	35.22
5 in. o.d. 9 B.W.G.	54.01	46.87	44.25
6 in. o.d. 7 B.W.G.	82.93	71.96	68.14

Extras for less carload quantities:

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb .or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought iron pipe)

Base Price = $200 Per Net Ton

Butt Weld

Steel	Black	Galv.
⅛ in.	56	36
¼ to ⅜ in.	59	43½
½ in.	63½	54
¾ in.	66½	58
1 to 3 in.	68½	60½
Wrought Iron	Black	Galv.
¼ and ⅜ in.	+9	+10
½ in.	24	6½
¾ in.	30	13
1 and 1¼ in.	34	19
1½ in.	38	21½
2 in.	37½	21

Lap Weld

Steel		
2 in.	61	52½
2½ and 3 in.	64	55½
3½ to 6 in.	66	57¼
7 and 8 in.	65	55½
9 and 10 in.	64½	55
11 and 12 in.	63½	54
Wrought Iron		
2 in.	30½	15
2½ to 3½ in.	31½	17½
4 in.	33½	21
4½ to 8 in.	32½	20
9 to 12 in.	28½	15

Butt weld, extra strong, plain ends

Steel	Black	Galv.
⅛ in.	54½	41½
¼ to ⅜ in.	56½	45½
½ in.	61½	53½
¾ in.	65½	57½
1 to 3 in.	67	60
Wrought Iron		
¼ and ⅜ in.	+10	+43
½ in.	25	9
¾ in.	31	15
1 to 2 in.	38	22½

Lap weld, extra strong, plain ends

Steel		
2 in.	59	51½
2½ and 3 in.	63	55½
3½ to 6 in.	66½	59
7 and 8 in.	65½	56
9 and 10 in.	64½	55
11 and 12 in.	63½	54
Wrought Iron		
2 in.	33½	18½
2½ to 4 in.	39	25½
4½ to 6 in.	37½	24
7 and 8 in.	38½	24½
9 to 12 in.	32	20½

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher, on all butt weld 8 in. and smaller.

STRONG-CAST

BETTER STEEL CASTINGS
DEMAND BETTER STEEL MAKING

The high regard Strong Steel castings have won in so many industries reflects Strong's skill as steel makers as well as steel casters. The melt being poured above comes from a 25 ton, acid bottom, oil fired, open hearth furnace of special Strong design. It will pay you to know Strong steels well—write or wire for the facts.

STRONG STEEL FOUNDRY COMPANY, BUFFALO, N. Y.

STRONG

TENSILE STRENGTH · ELONGATION

ORES

Lake Superior Ores

Delivered Lower Lake Ports

	Per Gross Ton
Old range, bessemer, 51.50%...	$4.75
Old range, non-bessemer, 51.50%	4.60
Mesaba, bessemer, 51.50%.....	4.60
Mesaba, non-bessemer, 51.50%.	4.45
High phosphorus, 51.50%.....	4.35

Foreign Ores*

C.i.f. Philadelphia or Baltimore, Exclusive of Duty

	Per Unit
African, Indian, 44 to 48% Mn.	57c. to 61c.
African, Indian, 49 to 51% Mn.	60c. to 65c.
Brazilian, 46 to 48% Mn...	54c. to 59c.
Cuban, del'd, duty free, 51% Mn.	67½c. to 71c.

	Per Short Ton Unit
Tungsten, Chinese, Wolframite, duty paid, delivered.....	$23 to $24
Tungsten, domestic, scheelite, delivered	$23.00
Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton: South African (low grade).....	Nom.
Rhodesian, 45%	$25.00
Rhodesian, 48%	$28.00 to $30.00

RAILS, TRACK SUPPLIES

	F.o.b. Mill
Standard rails, heavier than 60 lb., gross ton.....	$40.00
Angle bars, 100 lb.....	2.70
F.o.b. Basing Points	
Light rails (from billets), gross ton	$40.00
Light rails (from rail steel), gross ton	39.00
	Base per Lb.
Cut spikes	3.00c.
Screw spikes	4.55c.
Tie plates, steel.....	2.15c.
Tie plates, Pacific Coast.....	2.30c.
Track bolts, steam railroads...	4.15c.
Track bolts, discount to jobbers all sizes (per 100 counts)....	65-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneaqua, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond, Va.

FLUORSPAR *Per Net Ton*

Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail...	$20.00 to $21.00
Domestic, f.o.b. Ohio River landing barges	20.00 to 21.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines..	20.00 to 21.00
Foreign, 85% calcium fluoride, not over 5% Si., c.i.f. Atlantic ports, duty paid.....	Nominal
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines....	31.00
As above, in bags, f.o.b. same mines	32.60

REFRACTORIES

Fire Clay Brick	*Per 1000 f.o.b. Works*
Super-duty brick at St. Louis..	$60.80
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey....	52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois.....	42.75
Second quality, New Jersey....	49.00
No. 1 Ohio.....	39.90
Ground fire clay, per ton.....	7.10
Silica Brick	
Pennsylvania	$47.50
Chicago District	55.10
Birmingham	47.50
Silica cement, net ton (Eastern)	8.55

Chrome Brick	*Net per Ton*
Standard f.o.b. Baltimore, Plymouth Meeting and Chester...	$50.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	
Magnesite Brick	
Standard f.o.b. Baltimore and Chester	$72.00
Chemically bonded, f.o.b. Baltimore	61.00
Grain Magnesite	
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks).....	(—)*
Domestic, f.o.b. Baltimore and Chester in sacks	$40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

*None available.

MILLIONS
of machine finished
Bronze Bearings

HUNDREDS OF *Different* SIZES

Immediately from STOCK

The next time you need bronze bearings or bushings . . . *specify* JOHNSON GENERAL PURPOSE. Select the exact dimensions you want from our stock list of over 800 individual sizes. And then check us for rapid delivery. Your order will be shipped the same day it is received.

Vast stores of each individual size are maintained in every principal industrial city. These stocks are supported by eighteen strategically located warehouses.

Johnson General Purpose Bearings are cast in S.A.E. 64. This assures you the maximum in performance and bearing life. Every bearing is machine finished, ready for assembly. Oil grooves, slots or holes can quickly, easily be added. Why not try this remarkable service on your next order?

WRITE FOR FREE CATALOGUE

JOHNSON BRONZE

Sleeve BEARING HEADQUARTERS

505 S. MILL STREET • NEW CASTLE, PA.

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload).....$120.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%.....$36.00
Domestic, 26 to 28%..... 49.50

Electric Ferrosilicon

Per Gross Ton, Delivered, Lump Size

50% (carload lots, bulk).....$74.50*
50% (ton lots, packed..... 87.00*
75% (carload lots, bulk).....135.00*
75% (ton lots, packed).....151.00*

Bessemer Ferrosilicon

Per Gross Ton, F.o.b. Jackson, Ohio

10.00 to 10.50%.....$34.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2% $1 per ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton, F.o.b. Jackson, Ohio

5.00 to 5.50%.....$28.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots Lump Size, on Contract

4 to 6% carbon.....11.00c.
2% carbon .....17.50c.
1% carbon .....18.50c.
0.10% carbon .....20.50c.
0.06% carbon .....21.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon $113.00*
2.50% carbon 118.00*
2% carbon 123.00*
1% carbon 133.00*

Other Ferroalloys

Ferrotungsten, per lb. contained W, del. carload..... $2.00
Ferrotungsten, 100 lb. and less 2.25
Ferrovanadium, contract, per lb. contained V, del'd $2.70 to $2.90†
Ferrocolumbium, per lb. contained columbium f.o.b. Niagara Falls, N. Y., ton lots ..... $2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace, carload and contract, per net ton.....$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract per net ton.....$157.50

*Spot prices are $5 per ton higher.
†Spot prices are 10c. per lb. of contained element higher.

Ferrophosphorus, electric or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton 58.50

Ferrophosphorus, electrolytic 23-26% in carlots, f.o.b. Monsato (Siglo), Tenn., 24%, per gross ton, $3 unitage, freight equalized with Nashville 75.00

Ferromolybdenum, per lb. Mo, f.o.b. furnace ..... 95c.

Calcium molybdate, per lb. Mo, f.o.b. furnace ..... 80c.
Molybdenum oxide briquettes 48-52% Mo, per lb. contained Mo, f.o.b. Langeloth, Pa. 80c.

FUEL OIL

No. 3, f.o.b. Bayonne, N. J.....4.00c.
No. 6, f.o.b. Bayonne, N. J.....2.98c.
No. 5 Bur. Stds., del'd Chicago..3.25c.
No. 6 Bur. Stds., del'd Chicago..2.75c.
No. 3 distillate, del'd Cleveland..5.50c.
No. 4 industrial, del'd Cleveland.5.25c.
No. 5 industrial, del'd Cleveland.5.00c.
No. 6 industrial, del'd Cleveland.4.75c.

RECENT INSTALLATIONS PROVE *Versatility*
OF DETROIT AUTOMATIC ELECTRIC ROCKING FURNACES

In industrial plants from coast to coast Detroit automatic Rocking Electric Furnaces are successfully melting an amazing variety of products. For example, take the products of nine recent installations:

NAVY "G" BRONZE — ALUMINUM BRONZE
SPECIAL CUTTING ALLOYS — STAINLESS STEEL
VALVE ALLOYS — SPECIAL HEAT RESISTANT STEELS
NAVY "M" BRONZE — ALLOY GREY IRONS
SHORT CYCLE MALLEABLE IRON

Not only for versatility, but also for production speed, accuracy, ease of control and economy, you cannot beat a Detroit Electric Furnace. Write today for complete facts and prices.

DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY MICHIGAN

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, prompt ..... $5.25 to $5.75

Foundry, f.o.b. Connellsville, prompt ..... $5.50 to $6.00

F'dry, by-product, Chicago 10.50

F'dry, by-product, New England 13.00

Foundry, by-product, Newark or Jersey City ..... $11.30 to $11.90

F'dry, by-product, Philadelphia. 11.63

F'dry, by-product, Cleveland... 11.55

F'dry, by-product, Cincinnati... 11.00

Foundry, Birmingham 7.50

F'dry, by-product, St. Louis $10.75 to $11.00

Foundry, from Birmingham, f.o.b. cars dock Pacific ports..... $14.75

BRITISH

British

Per Gross Ton, f.o.b. United Kingdom Ports

Ferromanganese, export	£29	16s. 3d.
Tin plate, per base box.	32s.	to 33s.
Steel bars, open hearth	£16	10s.
Beams, open hearth	£15	8s.
Channels, open hearth	£15	8s.
Angles, open hearth	£15	8s.

Black sheets, No. 24, gage £22 5s. max.* £22 5s. min.**

Galvanized sheets, No. 24 gage £25 12s. 6d. max.*; £25 12s. 6d. min.**

*Empire markets only.
**Other than Empire markets.

PIG IRON (Per Gross Ton)

Prices delivered various consuming points indicated by bold italics

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phos.
Boston	***$25.50***	***$25.00***	***$26.50***	***$26.00***	.....
Brooklyn	***27.50***	.....	.....	***28.00***	.....
Jersey City	***26.63***	***26.03***	***27.53***	***27.03***	.....
Philadelphia	***25.84***	***25.34***	***26.84***	***26.34***	.....
Bethlehem, Pa.	$25.00	$24.50	$26.00	$25.50	.....
Everett, Mass.	25.00	24.50	26.00	25.50	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....
Steelton, Pa.	.....	24.50	.....	.....	28.50
Birdsboro, Pa.	25.00	24.50	26.00	25.50	28.50
Sparrows Point, Md.	25.00	24.50	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....
Sharpsville, Pa.††	24.00	23.50	24.50	24.00	.....
Buffalo	24.00	23.00	25.00	24.50	28.50
Cincinnati	***24.44***	***24.61***	.....	***25.11***	.....
Canton, Ohio	***25.39***	***24.89***	***25.89***	***25.39***	.....
Mansfield, Ohio	***25.94***	***25.44***	***26.44***	***25.94***	.....
St. Louis	***24.50***	***24.02***	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	.....
Granite City, Ill.	24.00	23.50	24.50	24.00	.....
Cleveland	24.00	23.50	24.50	24.00	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....
Toledo	24.00	23.50	24.50	24.00	.....
Youngstown††	24.00	23.50	24.50	24.00	.....
Detroit	24.00	23.50	24.50	24.00	.....
St. Paul	***26.63***	.....	***27.13***	***26.63***	.....
Duluth	24.50	.....	25.00	24.50	.....
Birmingham	19.38	18.00	24.00	.....	.....
Los Angeles, San Francisco and Seattle	***27.50***	.....	.....	.....	.....
Provo, Utah	22.00	.....	.....	.....	.....
Montreal†	27.50	27.50	.....	28.00	.....
Toronto†	25.50	25.50	.....	26.00	.....

GRAY FORGE		CHARCOAL	
Valley or Pittsburgh fce.	$23.50	Lake Superior fce.	$27.00
		Delivered Chicago	30.34

Base prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Delivered prices on Southern iron for shipment to Northern points are 38c. a ton below delivered prices from nearest Northern basing point on iron with phosphorus content of 0.70 per cent and over. †On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

††Pittsburgh Coke & Iron and Struthers furnaces are quoting $24.50 a ton for No. 2 foundry, basic and malleable, and $25.00 a ton for bessemer iron at Sharpsville and Youngstown.

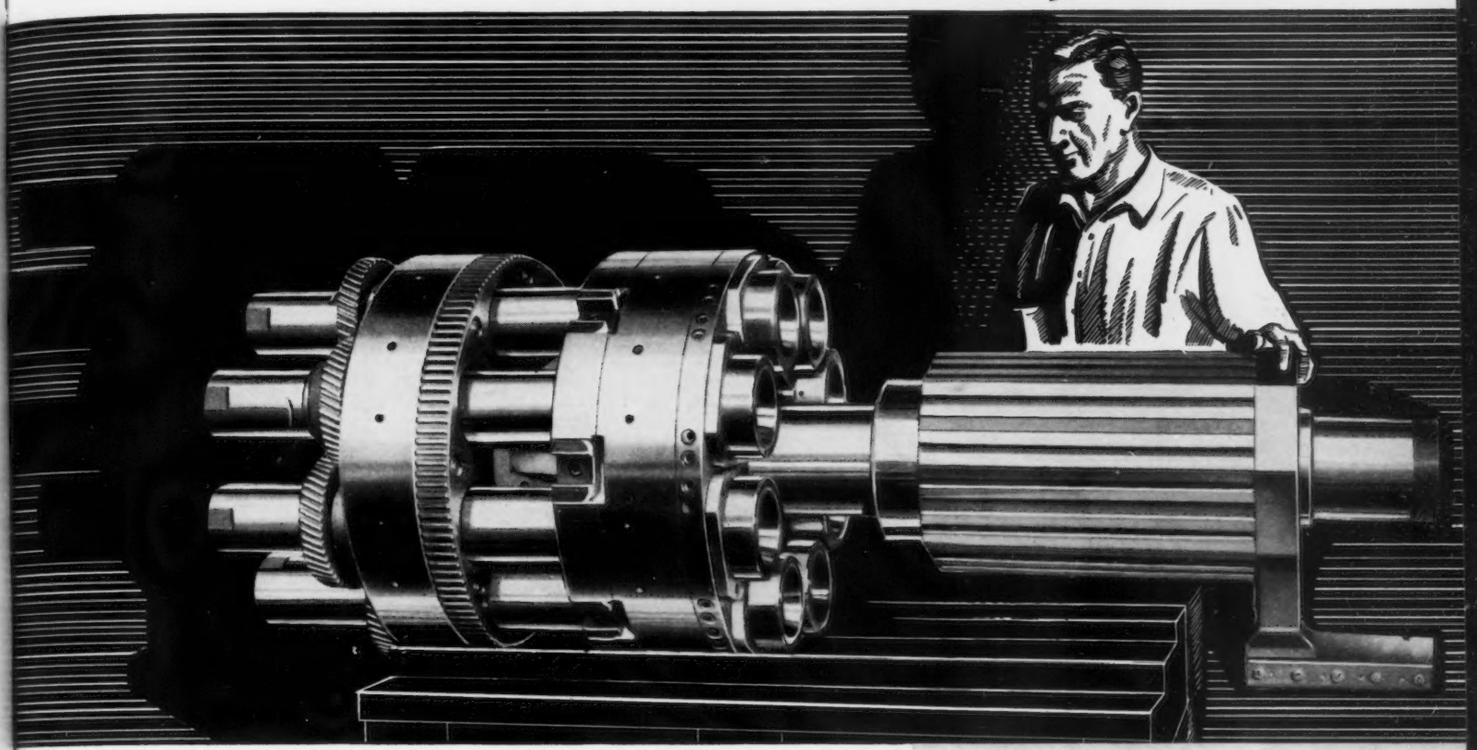
WAREHOUSE PRICES

(Base Prices, Dollars per 100 lb., Delivered Metropolitan Areas)

	Pittsburgh	Chicago	Cleveland	Philadelphia	New York	Detroit	Buffalo	Boston	Birmingham	St. Louis	St Paul	Milwaukee	Los Angeles
Sheets, hot rolled	$3.35	$3.05	$3.35	$3.55	$3.58	$3.23	$3.25	$3.71	$3.45	$3.39	$3.30	$3.38	$4.30
Sheets, cold rolled	....	4.10	4.05	4.05	4.40	4.30	4.30	3.68	....	4.12	4.35	4.23	6.50
Sheets, galvanized	4.75	4.60	4.62	4.90	5.00	4.64	4.75	5.11	4.75	4.87	4.75	4.98	5.25
Strip, hot rolled	3.60	3.40	3.50	3.95	3.96	3.48*	3.82	4.06	3.70	3.74	3.65	3.73	....
Strip, cold rolled	3.20	3.30	3.20	3.31	3.51	3.20	3.22	3.46	....	3.61	3.83	3.54	....
Plates	3.40	3.55	3.40	3.55	3.76	3.60	3.62	3.85	3.35	3.69	3.80	3.68	4.00
Structural shapes	3.40	3.55	3.58	3.55	3.75	3.65	3.40	3.85	3.55	3.69	3.80	3.68	4.15
Bars, hot rolled	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.50	3.64	3.75	3.63	4.15
Bars, cold finished	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.43	4.02	4.34	3.88	6.60
Bars, ht. rld. SAE 2300	7.20	7.10	7.55	7.31	7.60	7.42	7.35	7.50	....	7.72	7.45	7.58	9.40
Bars, ht. rld. SAE 3100	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	....	6.02	6.00	5.88	8.55
Bars, cd. drn. SAE 2300	8.15	8.15	8.40	8.56	8.84	8.45	8.40	8.63	....	8.77	8.84	8.63	10.65
Bars, cd. drn. SAE 3100	6.75	6.75	7.75	7.16	7.19	7.05	6.75	7.23	....	7.12	7.44	6 98	9.80

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb.; galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, one to nine bundles, cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb., galvanized sheets, 450 to 1499 lb.; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; Birmingham, hot rolled sheets, strip and bars, plates and shapes, 400 to 3999 lb., galvanized sheets, 500 to 1499 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.; Milwaukee, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.; New York, hot rolled sheets, 0 to 1999 lb., cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, shapes, cold rolled sheets, 300 to 1999 lb., galvanized sheets, 150 to 1049 lb. Extras for size, quality, etc., apply on above quotations. *12 gage and heavier, $3.23.

LOOK INTO THE "HEART" OF AN Acme-Gridley



THE END TOOL SLIDE is mounted around the heavy forged spindle carrier stem, which is integral with the spindle head and ground concentrically with it at one setting.

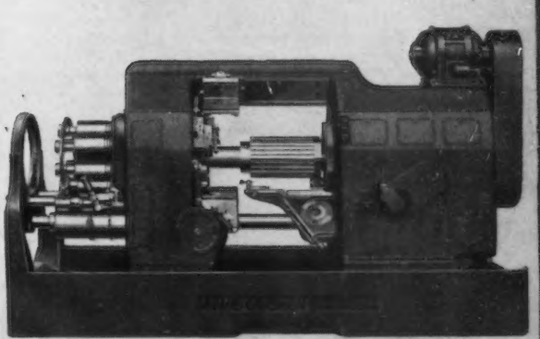
The stem is also rigidly end-supported in the gear box, and the tool slide (with its full length bearing around the stem) is supported by the under-arm on a guide slide.

The total width of the two spindle carrier bearings is two-thirds the length of the heavy carrier housing. Into the carrier are fitted precision ground spindles, mounted in anti-friction bearings.

Special design equipment is used for spacing, boring, finishing spindle holes, for boring end slide tool holders from the work spindle, and for aligning them with all spindles to exceedingly fine limits.

Carrier bearings, end and side tool slides are adjustable after wear, and exact travel of all slides is controlled by positive stops.

Here is the kind of design and construction that you will find in the "heart" of an Acme-Gridley—the kind that will carry through today's high tension schedules, yet continue to serve you profitably when orders are scarce—because...



Model RA Acme-Gridley Bar Automatics sustain accuracy at the fastest feeds and highest spindle speeds that cutting tools can safely stand.

NATIONAL ACME

170 EAST 131ST STREET • CLEVELAND, O.

ACME-GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND TAPS • SCREW MACHINE PRODUCTS • THE CHRONOLOG • LIMIT SWITCHES • POSITIVE CENTRIFUGE • CONTRACT MANUFACTURING

Sales Possibilities

. . . CONSTRUCTION, PLANT EXPANSION AND EQUIPMENT BUYING

North Atlantic States

• **Springfield Bronze & Aluminum Co.,** Page Boulevard, Springfield, Mass., bushings, bearings, etc., has let general contract to A. L. Phelps, Inc., 11 Andrew Street, for one-story addition, about 55 x 100 ft. Cost over $50,000 with equipment. H. L. Sprague, 1570 Main Street, is engineer.

International Silver Co., Meriden, Conn., has let general contract to H. Wales Lines Co., 134 State Street, for one-story addition, 140 x 150 ft., and two-story extension, 30 x 80 ft., to branch plant at Wallingford, Conn. Cost over $100,000 with equipment.

Plastex Corp., Red Spring Road, Andover, Mass., plastic products, chemicals, etc., plans rebuilding part of plant, including boiler house, recently destroyed by fire. Loss close to $100,000 with equipment. Company is a subsidiary of North American Chemical Co., Cambridge, Mass.

General Electric Co., Bridgeport, Conn., has let general contract to Gellatly Construction Co., 25 Housatonic Avenue, for one-story top addition, 32 x 85 ft., to machine shop. Cost close to $50,000 with equipment.

Bethlehem Steel Co., Shipbuilding Division, Quincy, Mass., has let general contract to W. M. Bailey Co., 88 Broad Street, Boston, for two one-story and one two-story additions to shop units at local Fore River shipyard, first noted, 145 x 565 ft., and 75 x 245 ft., for a turret shop and armor plate mill, respectively; and two-story unit, 50 x 100 ft., for storage and distribution. Cost over $650,000 with machinery.

Humason Mfg. Co., Stafford Avenue, Forestville, Conn., springs, metal stampings, etc., will begin superstructure soon for one-story addition, 30 x 75 ft., for expansion in plating and japanning departments. Torrington Building Co., Torrington, Conn., is general contractor. Cost close to $45,000 with equipment.

National Carbide Corp., 60 East Forty-second Street, New York, has acquired tract near Bell's Lane, Louisville, fronting on Ohio River, for new plant for production of calcium carbide, acetylene gas and other specialties. Two electric furnaces and accessory equipment will be installed. Cost close to $1,000,000 with machinery.

American Locomotive Co., 30 Church Street, New York, has asked bids on general contract for two-story addition, 50 x 260 ft., to plant at Schenectady, N. Y. Cost over $150,000 with equipment.

Sperry Gyroscope Co., Inc., 40 Flatbush Avenue Extension, Brooklyn, precision instruments and parts, will carry out expansion for production of equipment for Government, which has authorized fund of $3,025,000 for machinery installation and other work.

Metoloy Corp., 580 Fifth Avenue, New York, special alloy steels for precision tools, has purchased former one-story plant, about 17,000 sq. ft. of floor space, of McKesson-Robbins Co., Norwalk, Conn., and will remodel for new plant.

General Electric Co., Schenectady, N. Y., has approved plans for one-story addition, 60 x 450 ft., to building No. 73, and will carry out erection with company forces. Cost over $250,000 with equipment.

Remington-Rand, Inc., 465 Washington Street, Buffalo, plans three-story addition to plant No. 2 at Ilion, N. Y. Cost close to $150,000 with equipment.

Electro Refractories & Alloys Corp., Andrews Building, Buffalo, grinding wheels and kindred products, plans one-story addition to plant at Lackawanna. Cost over $50,000 with equipment.

Buffalo Bolt Co., East Avenue and Oliver Street, North Tonawanda, N. Y., bolts, nuts, rivets, etc., plans one-story addition and improvements in present buildings. Cost close to $60,000 with equipment.

John Deere Plow Co., 125 Marcellus Street, Syracuse, N. Y., agricultural implements, plans call for bids in about a month for one-story factory branch, storage and distributing plant at Colonie, N. Y. Cost close to $80,000 with equipment. Main offices are at Moline, Ill.

Worthington Pump & Machinery Corp., Clinton and Roberts Streets, Buffalo, has let general contract to Austin Co., Cleveland, for one-story addition, 80 x 175 ft., for production of air compressors for Government naval vessels. Cost close to $100,000 with equipment.

Public Service Electric & Gas Co., 80 Park Place, Newark, N. J., has authorized further expansion in Marion steam-electric generating station, Jersey City, to cost close to $4,000,000. Award for 50,000-kw. turbine-generator unit has been made to General Electric Co., and contracts for other equipment will be made soon. Company also plans one-story experimental plant and laboratory at Maplewood, N. J., 100 x 180 ft. Cost over $200,000 with equipment.

Chesbro-Whitman Co., 38-21 Twelfth Street, Long Island City, ladders, scaffolds, etc., subsidiary of Patent Scaffolding Co., Inc., with adjoining works, has purchased one-story building at 748-50 South Twelfth Street, Newark, N. J., for branch plant.

J. T. Baker Chemical Co., North Broad Street, Phillipsburg, N. J., has let general contract to Phillipsburg Bridge & Construction Co., Phillipsburg, for three one-story additions, 40 x 40 ft., 50 x 55 ft., and 120 x 140 ft., last noted for storage and distribution, other structures for expansion in production. Cost close to $75,000 with equipment.

American Steel & Wire Co., 80 Hamilton Avenue, Trenton, N. J., plans one-story addition for storage and distribution. Cost about $55,000 with equipment.

Bureau of Yards and Docks, Navy Department, Washington, plans expansion at Naval Air Station, Lakehurst, N. J., including shops for airplane repairs and maintenance, service buildings and other structures. Cost about $2,450,000. Appropriation will be arranged in that amount.

Empire Ordnance Co., Manayunk, Philadelphia, operating at former plant of Pencoyd Iron Works for production of munitions for Government, has let general contract to Manayunk Construction Co., Manayunk, for one-story addition for expansion in electric furnace department. Cost over $50,000 with equipment. Main offices are at 521 Fifth Avenue, New York.

York Safe & Lock Co., York, Pa., has let general contract to Cummins Construction Corp., 803 Cathedral Street, Baltimore, for one-story plant, 110 x 600 ft., in Springettsbury Township, near city. Cost close to $500,000 with equipment.

General State Authority, Second and Locust Streets, Harrisburg, Pa., asks bids until March 25 for boiler plant equipment for Laurelton State Village, Laurelton, Union County (Contract No. C-2).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until March 11 for anchor chain and detachable links for Philadelphia and Mare Island Navy Yards (Schedule 5498); until March 13 for 16,000 lb. of aluminum alloy pipe (aluminum-manganese) for Philadelphia and Western yards (Schedule 5517).

Aero Supply Mfg. Co., Corry, Pa., screw products for airplanes, will begin superstructure for two-story and basement addition, 125 x 190 ft., for which general contract recently was let to H. Platt Co., 922 Raspberry Street, Erie, Pa. Cost close to $175,000 with equipment.

National Munitions Co., Inc., recently organized subsidiary of National Powder Co., Eldred, Pa., has let general contract to William Zeilley, Olean, N. Y., for new plant on 300-acre tract on Eldred-Portville Road, for shell-loading and fuze-assembling for Government. Cost close to $350,000 with equipment, instead of smaller sum previously noted.

Public Works Officer, Building No. 1, Navy Yard, Philadelphia, asks bids until March 12 for a projectile-loading plant at naval ammunition depot, Fort Mifflin, Pa. (Specification 10250).

Glenn L. Martin Co., Middle River, Baltimore, airplanes and parts, will begin superstructure soon for one-story engineering building, about 101,000 sq. ft. floor space. Cost over $500,000 with equipment. Work is under way on one-story addition to assembling plant, about 153,000 sq. ft. of floor space; cost over $750,000 with equipment. This is part of expansion program to represent investment of more than $20,000,000.

Federal Works Administration, Washington, plans installation of air-conditioning system in terminal structures and administration building at Washington National Airport, Gravelly Point. Cost about $140,000. Appropriation in that amount is being arranged.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until March 11 for two motor-driven combination static and dynamic balancing machines, one with capacity of 10,000 to 20,000 lb., and other, 20,000 to 35,000 lb. (Schedule 5461), steel wire nails (Schedule 5552), brass disks (Schedule 5567), electric cable (Schedule 5511), grinders (Schedule 5480), gate valves (Schedule 5496), tank gages (Schedule 5497), grinders (Schedule 5489), testing machines (Schedule 5509), electric hoists (Schedule 5504); until March 13 for lead pipe (Schedule 5541); until March 14, forgings (Schedule 5505) for Eastern and Western yards.

The South

• **Westinghouse Electric & Mfg. Co.,** East Pittsburgh, has let general contract to Rust Engineering Co., Clark Building, for one, two and three-story factory branch, storage and distributing plant, 250 x 511 ft., at Atlanta, Ga. Cost close to $750,000 with equipment. Robert & Co., Bona-Allen Building, Atlanta, are architects and engineers.

Ingalls Iron Works Co., Birmingham, plans expansion in shipbuilding works at Decatur, Ala., including one-story shops and other facilities for construction of mine-sweepers and mine-layers for Navy Department. Cost over $275,000.

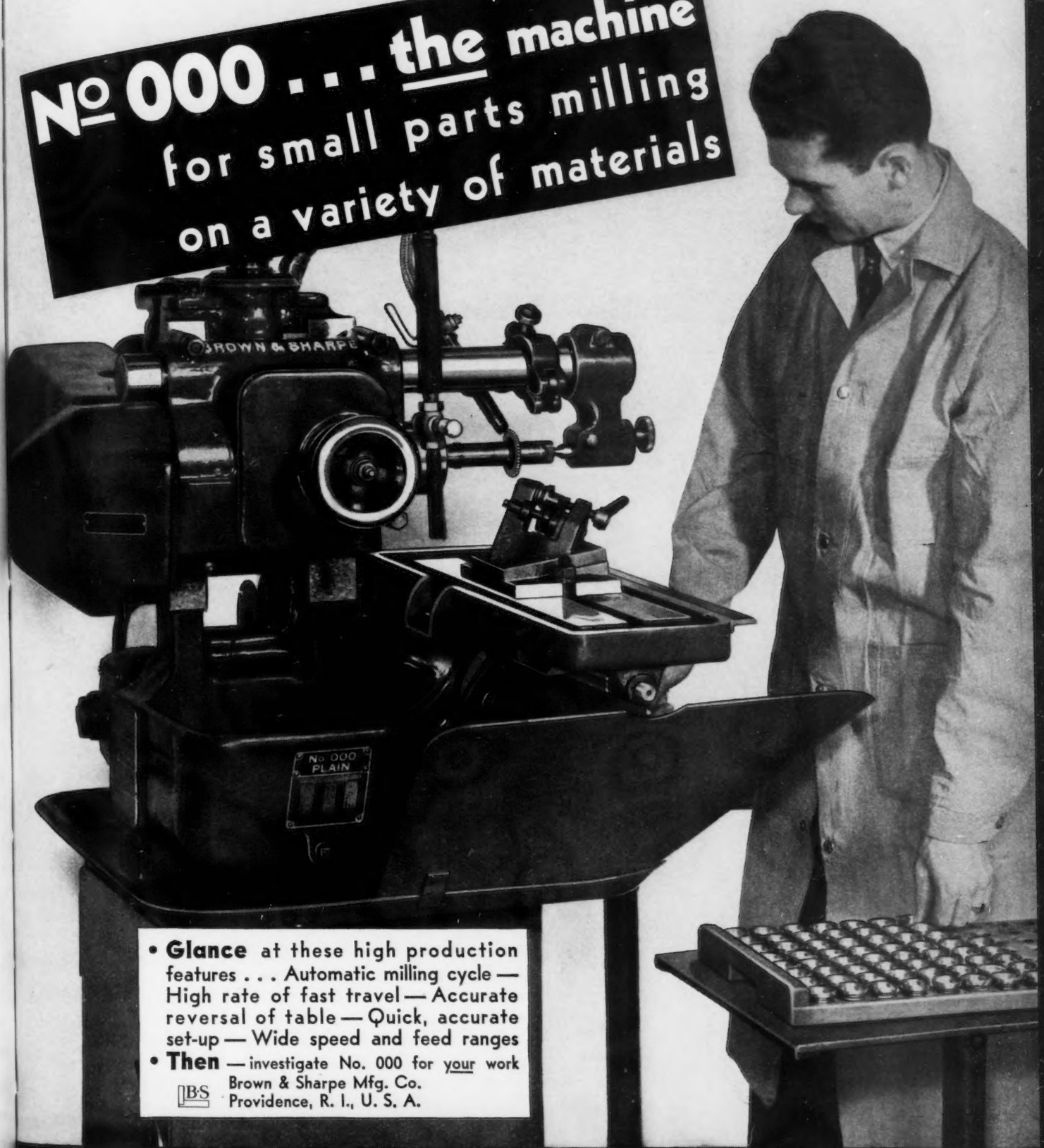
Quartermaster, Maxwell Field, Birmingham, asks bids until March 11 for one motor-driven band saw and one saw bench (Circular 707-62).

Reynolds Alloys Co., Inc., recently organized subsidiary of Reynolds Metals Co., Inc., Federal Reserve Bank Building, Richmond, Va., has let contract to F. H. McGraw Co., Middletown, Ohio, for new plant at Lister, Ala., including rolling mills, shops and other structures, for production of aluminum shapes for airplane manufacture. Revised estimates of cost total close to $10,000,000 instead of smaller sum previously noted. Plant will be operated in conjunction with works for production of aluminum from bauxite now in course of erection on neighboring site by parent company.

Federal Alloy Block Co., Cincinnati, care of John H. Flynn, president, Economy Supply Co., 126 East Pearl Street, recently organized by Mr. Flynn and associates, has leased two and three-story building, about 11,000 sq. ft. of floor space, at Twelfth Street and Central Avenue, Newport, Ky., for production of metal alloy block ballasts, blocks, tackles, etc., for

-YOUR ALLY IN DEFENSE WORK

No 000 . . . the machine for small parts milling on a variety of materials



- **Glance** at these high production features . . . Automatic milling cycle — High rate of fast travel — Accurate reversal of table — Quick, accurate set-up — Wide speed and feed ranges
- **Then** — investigate No. 000 for your work

B·S Brown & Sharpe Mfg. Co.
Providence, R. I., U. S. A.

BROWN & SHARPE

marine service. Output will be used by Navy Department.

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until March 10 for mechanical fans, motors, pumps, air filters, air coolers, unit heaters and auxiliary equipment for power building at Chattanooga, Tenn.

Solvay Process Co., and Atmospheric Nitrogen Corp., 40 Rector Street, New York, affiliated organizations, both subsidiaries of Allied Chemical & Dye Corp., have closed agreement with War Department, Washington, for new plant at West Henderson, Ky., for production of synthetic ammonia, to be known as Ohio River Ordnance Works. It will consist of one and multi-story production units on about 1000-acre tract, with shops, pumping station, power house and other structures. Fund of $15,484,195 has been authorized by Government for project, of which about $13,600,000 will be expended for buildings and machinery.

Coca-Cola Bottling Co., Baton Rouge, La., has asked bids on general contract for two-story addition to mechanical-bottling plant, 45 x 104 ft. Cost over $75,000 with equipment. Raymond G. Post, Louisiana National Bank Building, is architect.

Firestone Tire & Rubber Co. of Texas, Inc., 421 North Main Street, Houston, Tex., has let general contract to George C. Chambers, 4039 University Avenue, for one-story factory branch, storage and distributing building on local site. Cost close to $50,000 with equipment. Rice Institute, Esperson Building, is architect.

Shell Oil Co., Inc., 100 Bush Street, San Francisco, has let contract to C. F. Braun & Co., 1000 South Fremont Avenue, Alhambra, Cal., engineers, for plant at oil refinery at Deer Park, Houston, Tex., for production of butadiene, a basic ingredient of synthetic rubber. It will comprise several one and multi-story units, with auxiliary structures, tanks and other facilities. Petroleum gases and by-products from oil refinery will be used as raw material. Cost over $2,000,000 with equipment.

Central States

● **Tremco Mfg. Co.,** 393 East 131st Street, Cleveland, roofing cement, construction products, etc., plans new one-story plant, about 50,000 sq. ft. of floor space, with two-story office section. Cost over $150,000 with equipment. Christian, Schwarzenberg & Gaede, 1836 Euclid Avenue, are architects and engineers.

Standard Oil Co. of Ohio, Midland Building, Cleveland, plans addition to oil refinery at Toledo, for production of high-test aviation gasoline, with steel tanks and other facilities. Work is scheduled to begin in June. Cost over $2,000,000 with equipment.

Cyril Bath & Co., 6984 Machinery Avenue, Cleveland, bending presses and other tools and parts, have let general contract to A. M. Higley Co., 2036 East Twenty-second Street, for one-story addition, 35 x 105 ft. Cost over $60,000 with equipment. Garfield, Harris, Robinson & Schafer, National City Bank Building, are architects.

Marleau-Hercules Fence Co., 3516 Detroit Avenue, Toledo, Ohio, wire and other metal fencing, plans rebuilding one and two-story machine shop and boiler house recently damaged by fire. Loss close to $50,000 with equipment.

Parker Appliance Co., 17325 Euclid Avenue, Cleveland, tube couplings, fittings, etc., has leased one-story building, 40 x 460 ft., to be erected on adjoining site by Euclon Corp., Cleveland, for which general contract has been let to A. Macdougall Co., 5410 Stone Avenue. Cost over $100,000 with equipment.

Challenge Gauge & Tool Co., 560 North Elder Street, Indianapolis, tools, dies, gages, etc., has let general contract to Ivan Buenting, 1815 North Alabama Street, for one-story addition, about 25 x 120 ft. Cost close to $50,000 with equipment. E. C. Doeppers, Rauh Building, is engineer.

Bridgeport Brass Co., Bridgeport, Conn., brass and bronze tubing, pipe, wire, etc., has contracted with War Department, Washington, for new plant near Indianapolis, for production of cartridge cases. It will include storage and distributing buildings, power house and other units. Fund of $11,500,000 has been authorized for project, to be furnished by Government.

Lloyd A. Fry Roofing Co., 5302 West Sixty-sixth Street, Chicago, roofing products, has let general contract to Hiram Elliott Construction Co., 1016 Baltimore Street, Kansas City, Mo., for new branch plant at North Kansas City, Mo., with main one-story unit, 250 x 600 ft., and accessory structures. Cost close to $375,000 with equipment. Keene & Simpson, Land Bank Building, Kansas City, Mo., are architects.

McDonnell Aircraft Corp., Lambert-St. Louis Municipal Airport, St. Louis, has leased additional local buildings in connection with expansion program, and will take over one-story structure, about 20,000 sq. ft., at once, and later, another structure of 42,000 sq. ft. of floor space, for production of fabricated tail surfaces and other parts for Douglas and Boeing airplanes, for Government, which has approved appropriation of $396,000 for expansion.

Aircraft Accessories Corp., 5210 San Fernando Road, Glendale, Cal., airplane equipment and parts, has leased one-story building, 200 x 240 ft., to be built by Kansas City Industrial Land Co., Airport Administration Building, Kansas City, Kan., for new Eastern branch plant. Collins Construction Co., Davidson Building, Kansas City, Mo., is contractor. Cost over $175,000 with equipment. Charles E. Keyser, 609 Minnesota Avenue, Kansas City, Kan., is architect.

Marlo Coil Co., 6135 Manchester Avenue, St. Louis, refrigeration coils and kindred products, has asked bids on general contract for one-story and basement addition, 40 x 140 ft. Cost close to $65,000 with equipment. Brussel & Viterbo, Arcade Building, are engineers.

Murray Corp. of America, Inc., 7700 Russell Street, Detroit, automobile bodies and other heavy metal stampings, will carry out expansion for production of aircraft wing assemblies for Douglas airplanes for Government, which has authorized an appropriation of $1,952,474 for project.

Michigan Molded Plastics, Inc., Dexter, Mich., plans two one-story additions for expansion in production. Cost over $50,000 with equipment.

Wickes Brothers, Washington Avenue, Saginaw, Mich., metal-working machinery and parts, plan one-story addition, 80 x 190 ft., for expansion in machine shop. Cost over $85,000 with equipment. Frantz & Spence, Saginaw, are architects.

Gear Grinding Machine Co., 3901 Christopher Street, Detroit, special machinery and parts, has let general contract to Haberkorn-Barry Co., 2658 Porter Street, for one-story addition. Cost about $45,000 with equipment. H. E. Beyster Co., General Motors Building, is architect.

N. A. Woodworth Co., 1241 Wanda Street, Ferndale, near Detroit, mechanical equipment, plans expansion, including one or more one-story buildings and installation of equipment for production of aircraft engine parts for Government, which has approved fund of $738,944 for expansion.

Wisconsin Steel Works, 2701 East 106th Street, South Chicago, has let general contract to W. J. Lynch Co., 208 South LaSalle Street, Chicago, for one-story addition for expansion in foundry. Cost over $175,000 with equipment.

Ohmite Mfg. Co., 4835 West Flournoy Street, Chicago, electrical equipment, has let general contract to Anderson & Winblad, 6285 South Michigan Avenue, for one-story addition, 125 x 125 ft., with improvements in present plant. Cost over $100,000 with equipment. Alfred S. Alschuler & Ralph N. Friedman, Inc., 28 East Jackson Boulevard, is architect.

American Brass Co., Waterbury, Conn., brass, bronze, copper sheets, rods, tubes and kindred products, plans new plant near Kenosha, Wis., for production of ammunition, brass ammunition cups and allied arms specialties for Government, to include storage and distributing buildings, power house and other structures. Cost $4,750,000. Fund of that amount will be provided by War Department, Washington.

City Council, Grimes, Iowa, asks bids until March 17 for extensions and improvements in municipal power plant, including two diesel engine-generator units and auxiliary equipment. Ralph W. Gearhart, Cedar Rapids, Iowa, is consulting engineer.

Paragon Electric Co., 37 West Van Buren Street, Chicago, time-switches and other electrical apparatus, has asked bids on general contract for one-story and basement addition, 94 x 280 ft., to plant at Manitowoc, Wis. Cost over $150,000 with equipment. Frazier & Raftery, Inc., 540 North Michigan Avenue, Chicago, are architects.

United States District Engineer, Maj. Halmer Swenholt, Omaha, Neb., has awarded general contract to Peter Kiewit Sons Co., Omaha National Bank Building, and Paschen Contractors, Inc., 405 North Desplaines Street, Chicago, for new plant at Fort Crook, Neb., for manufacture of airplanes for War Department, to be operated by Glenn L. Martin Co., Baltimore. It will comprise main two-story unit, 600 x 900 ft.; one-story die-casting shop, 100 x 260 ft.; one-story storage and distributing buildings, totaling 150,000 sq. ft. of floor space; boiler house and other structures. Cost about $10,300,000 with equipment. Albert Kahn Associated Architects & Engineers, Inc., Detroit, is architect and engineer.

Western States

● **Standard Oil Co. of California, Inc.,** 225 Bush Street, San Francisco, plans expansion in oil refinery at El Segundo, Cal., including new production units for high octane gasoline for aircraft, with cracking and other machinery; also other structures for additions in main refinery and by-products division, steel tanks and other facilities. Cost about $4,500,000 with machinery.

Lake Washington Shipyards, Inc., Houghton, near Kirkland, Wash., plans extensions in shipbuilding plant for vessel construction for Government, including new shipways, outfitting dock, fabricating and mechanical shops, and other structures. Cost about $700,000 with equipment, Federal fund to be secured in that amount.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until March 11 for one motor-driven, aircraft-type forming roll, metal-bending machine for San Diego Naval Air Station (Schedule 5516); steel gate valves, angle valves, relief valves, etc. (Schedule 5496); until March 14, steel forgings (Schedule 5505) for Mare Island and Puget Sound yards.

Pacific Pump Works, Inc., 5715 Bickett Street, Huntington Park, Cal., pumping machinery and parts, plans one-story addition, 70 x 100 ft. Cost close to $50,000 with equipment. W. M. Bostock, 6221 Pacific Boulevard, is engineer.

Stauffer Chemical Co., 636 California Street, San Francisco, chemicals, plans one-story factory branch, storage and distributing plant, 70 x 200 ft., at Berkeley, Cal. Cost close to $60,000 with equipment. Kaj Theill, 580 Market Street, San Francisco, is engineer.

Coca-Cola Bottling Co. of Oregon, Inc., 77 N. E. Holladay Street, Portland, has let general contract to Ertz-Burns & Co., Pittock Block, for new one and two-story plant on N. E. Couch Avenue, 215 x 288 ft., for mechanical-bottling, storage and distribution. Cost close to $275,000 with machinery. Jesse M. Shelton, Atlanta, Ga., is architect.

Canada

● **MacCraft Corp., Ltd.,** 218 Nelson Street, Sarnia, Ont., has let general contract to Consolidated Lumber Co., Ltd., Wallaceburg, Ont., for boat-building and repair plant, comprising main one-story building, 90 x 290 ft., and auxiliary structures. Cost close to $165,000 with equipment.

B. F. Goodrich Rubber Co. of Canada, Ltd., 251 King Street West, Kitchener, Ont., has let general contract to Dunker Construction Co., Ltd., Kitchener, for one-story addition, 25 x 130 ft. Cost about $80,000 with equipment. Prack & Prack, Pigott Building, Hamilton, Ont., are architects.